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MESSAGE CODING

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Shortcomings of the Standard Subject Identification Code (SSIC) are identified, and its performance is compared with that of an alternate subject code. Potential uses of the extra information that a good subject code provides are developed, as is methodology for evaluating message codes.

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SUMMARY

The Standard Subject Identification Code (SSIC) is not effectively used by the Navy, and the potential benefits of accurate message subject coding are not being realized. This assertion is inferred from SSIC usage rates, information levels, and its use in aiding internal distribution. The first two measures, when applied to the Yom Kippur data base at CNA, show that:

- Only 42 percent of all messages and only 58 percent of Navy-originated messages contained an SSIC. Some of the Navy messages are exempt, yet 35 percent of them were coded, while only 77 percent of the nonexempt messages were.

- The SC, an alternate subject code, contained 14 percent more information for all the messages and 47 percent more information for operations-related messages than did the SSIC, where entropy is used as a measure of information.

- Of the SSICs, 8 percent had only one significant digit; another 20 percent had only 2 significant digits. When only operational messages are considered, these numbers degrade to 16 and 16 percent, respectively, for a net of 32 percent with an accuracy of 2 digits or less.

These measures show that the SSIC is not being used to effectively characterize the traffic. This is substantiated by the variability in use of the SSIC to denote internal distributions. For the 3 message centers considered, from less than 1 to more than 40 percent of the messages were routed on the basis of the SSIC. Considering that up to 30 percent of the traffic is manually routed, there are undoubtedly messages containing SSICs that are not automatically routed, simply because some commands do not wish it. The use of a message subject indicator, however, is a valid concept. More than 77 percent of all messages and 84 percent of Navy-originated messages in the Yom Kippur data base contained either an SSIC or a recognized flagword or keyword.

An alternate subject code (SC) is considered in this research contribution. It has 7 major categories (compared with 13 in the SSIC) -- operations, intelligence, administration, supply, communications, environment, and special messages -- each divided into specific functional subcategories. Specific subjects are identified within each subcategory. This functional, hierarchial arrangement allows grouping similar types of messages concerning different subjects and, ultimately, eases use of the code and improves its accuracy.

The SC has been used in earlier OEG studies and, more recently, with the Yom Kippur data base. This experience indicates that it is fundamentally a good subject code since:

- It can be applied to more than 98 percent of the Yom Kippur messages.
- It contains significantly more information than the SSIC even though it has fewer major categories.
- Only 0.7 percent of the SCs had just one significant digit, and 21 percent had 2 significant digits. When only operational messages are considered, essentially none had just one significant digit, and only 8 percent had 2-digit or less accuracy.

An effort is underway to improve the SC by incorporating the experience gained in this study. Some subcategories, particularly in the administration and supply sections, will be modified, but its basic format will remain the same. A major uncertainty about the SC rests in the ease and accuracy of use by message originators. An operational test and evaluation of the modified SC is proposed to remove this uncertainty.

In conjunction with this test, work should begin to use the information provided by an accurate message subject code. Such a code would be useful in:

- Improving accuracy -- hence, timeliness -- with which messages could be routed.
- Providing an easy mechanism for determining what classes of information are flowing at what precedence in the communications system (a form of "automatic" screening board; see reference 2).
- Providing a way to file and retrieve messages in addition to the current date time group-originator method.

Successful implementation of any one of these concepts would give the users an incentive to accurately apply a subject code and work toward its improvement.

The methodology developed in this report could serve as a basis for the proposed testing and evaluation of the SC. However, it can also serve as the basis for the continued testing of any code that may be ultimately accepted. Any code that is used should be dynamic, changing in response to users' needs. A continuing effort as part of the operational procedures should involve monitoring the frequency of use of the code values, deleting those that are not used, and, consequently, tailoring the code to the average traffic encountered so that a maximum amount of information is carried in the code.

Finally, this methodology enables objective comparison of different concepts of message coding, such as flagwords, office codes, and subject codes. This capability should prove useful in designing a message code that is acceptable to the joint services.

INTRODUCTION

The Standard Subject Identification Code (SSIC) is used by the Navy to subject code its messages. Unfortunately, the full potential of the concept is not being realized, partly because of inadequacies in the SSIC, and partly because the users receive no tangible benefits from its effective application.

This research contribution deals with both failings. SSIC shortcomings are identified and its performance is compared with that of an alternate subject code, and potential uses of the extra information that a good subject code provides are developed. These uses include traffic management, data-base formation, message retrieval, and improved internal-message distribution.

As a result of this analysis, a basis is established for comparing subject codes with each other and with other schemes of message encoding, such as office codes or flagwords. This is particularly relevant in the search for a message coding scheme mutually acceptable to the joint services for internal routing of messages.

To achieve these goals, a methodology for evaluating the effectiveness of a subject code is developed here. Analytical measures are introduced to analyze the code and its application to message traffic. A point of reference for these measures is formed by considering the actual use made of the information provided by the SSIC. Since these measures are applicable to any type of message encoding scheme -- office codes, subject codes, or otherwise -- they form a basis for comparison between schemes. Their use as design tools is also discussed.

Five different analytical measures of effectiveness are used: application rate, consistency, appropriateness, entropy, and coding level. Application rate is the percentage of messages under consideration that contain a subject code. Consistency indicates the variety of different codes applied to messages that should have identical codes. Appropriateness characterizes the use of codes that are totally unreasonable for the messages considered. These first three measures concern the application of a code to messages; the last two measures -- entropy and coding level -- describe the amount of information provided by the code and its utility once it is on the messages. Entropy is a probabilistic measure of the information level; it is described in appendix A. It has been used extensively in statistical mechanics and communications theory. Coding level denotes the number of significant digits in the code. For example, the SSIC//N03131// has a higher coding level than //N03000//, and presumably is more valuable for internally routing the message. The five measures together imply the basic characteristics of a good message code: It is used, it is accurate, and it contains worthwhile information.

These measures were applied to the Yom Kippur data base at CNA. This base consists of 6265 messages transmitted in the Mediterranean area on 25 October 1973 and 4 November 1973. They were collected at Navy communications stations servicing the U. S. Sixth Fleet. A copy of each message was delivered to the Operations Evaluation Group (OEG) and a new subject code (SC) manually assigned to it. This assignment was based upon the text of the message and was independent of the SSIC on the message. The SSIC, originator, addressees, and certain flagwords were also recorded for each message (see appendix B for a list of these flagwords). A more detailed description of the Yom Kippur data base and its formation is in reference 1. One of the key features of the base is that it is formed from real-world, operational, crisis-period data.

The SC used to encode these messages is a heirarchial code with seven major categories -- operations, intelligence, administration, supply, communications, environment, and special messages. Each category is divided into specific functional subcategories. For example, the operations category is subdivided into force activities, casualty reports (CasReps), operational support, unit movement, and command and control. Specific subjects are then identified within each subcategory. The full SC is listed in appendix C.

This code has its origins in earlier OEG studies. It has been refined and expanded in the process of being used to encode:

- All messages over EastPac broadcast from 8 through 17 September 1971.
- All traffic passing through Naval Communications Station (NCS) Morocco on 25 February, 28 February, and 1 March 1972.
- Sampled traffic through NCS Guam on 15 February 1972.
- Most of the messages passing through NCS Guam on 16 April 1972.
- All traffic passing the message center at Makalapa, Hawaii (which serves CinCPacFlt and ComServPac) on 1 July 1972.
- Sampled traffic from the message center aboard USS Oklahoma City.

Thus, the code has been used on a variety of traffic: crisis and noncrisis, exercise and normal, shore/ship interface, shore-based message center, and afloat message center (see references 2, 3, and 4).

This report begins with the SSIC evaluation, followed by a discussion of some of the potential uses of a good subject code. The methodology is then summarized and used to evaluate the SC, which is shown to be a workable solution to the problem.

An effort is underway to use the results of this analysis to improve the SC. Some of its subcategories will be modified, but its basic format will not be changed. It is recognized that the SC was applied after the fact and not in an operational environment. Therefore, there is some uncertainty regarding the ease and accuracy of use by message originators, and a test of the modified SC is proposed to remove this uncertainty.

STANDARD SUBJECT IDENTIFICATION CODE

The SSIC is the Navy message subject code. It is evaluated in this section using the measures described in the introduction. These measures are used to analyze the basic characteristics of usage, accuracy, and information.

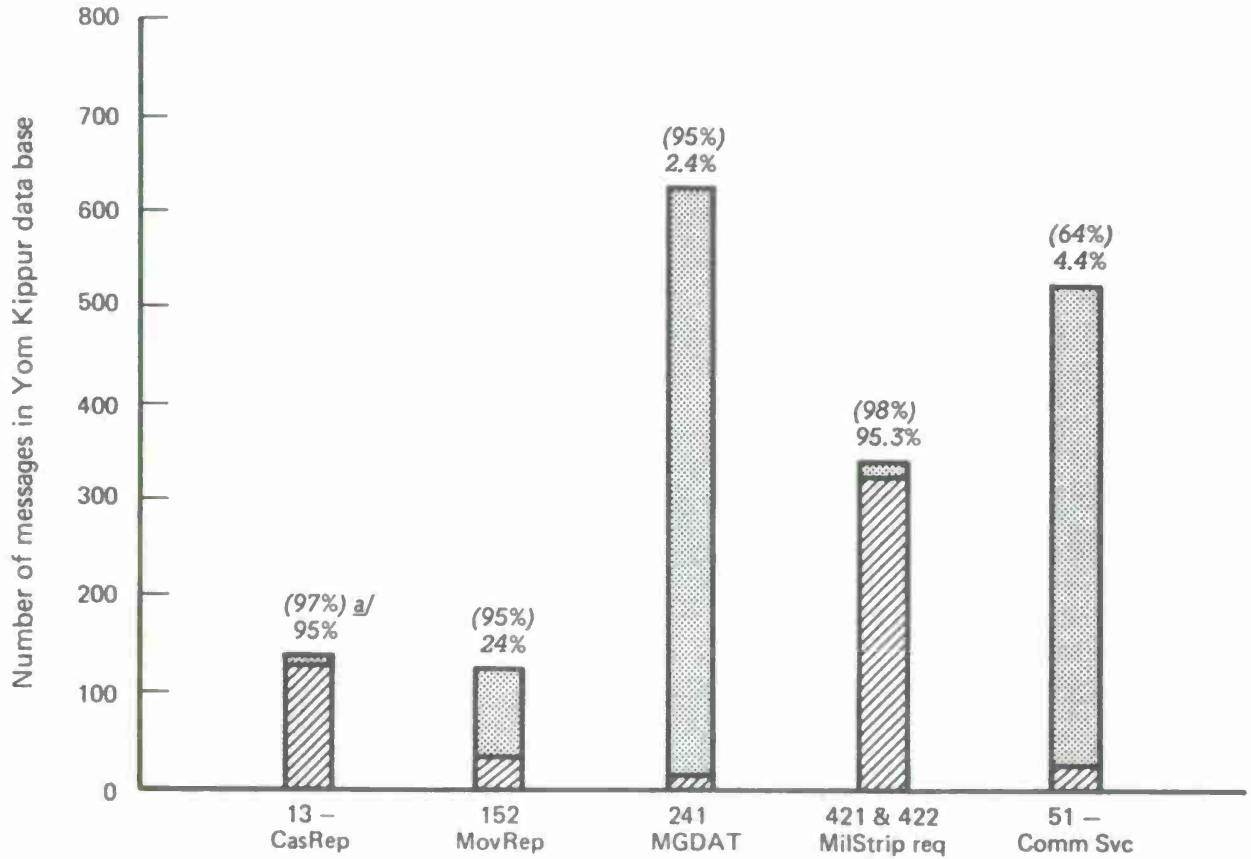
USAGE

Only 42 percent (2,633) of the 6,265 messages in the Yom Kippur data base contain an SSIC. The remainder either have zeros in the SSIC field or the field is left off the message. (Unfortunately, the SSIC //N00000// is not differentiated from a blank SSIC in this data base; both are recorded as "00000.")

These low rates partly result from non-Navy- or non-Marine Corps-originated messages. About 27 percent (1,701) of the messages in the data base are non-Navy-originated and, therefore, are exempt from using an SSIC. The major non-Navy originator is the Defense Automatic Addressing System (DAAS), which handles MilSTRIP documents messages for shore-based supply centers; DAAS does not use the SSIC. More than 500 messages came from DAAS. About 380 Air Force-originated messages are also in the data base, along with 300 service messages from various non-Navy communications centers. If these non-Navy originated messages were factored out, the SSIC application rate for Navy-originated messages would equal 58 percent (2,633/4,564).

OpNavInst 2100.1 affects SSIC use on these messages by exempting messages such as operational reports, (OpReps), movement reports (MovReps), and CasReps from SSIC use, along with messages using key words exclusively to denote subject matter (for example, Exercise High Heels). A copy of this instruction is contained in appendix D. These types of messages, together with communications service messages (for example, requests for retransmission) comprise 47 percent (2,129) of the 4,565 Navy-originated messages in the Yom Kippur data base, and can be construed to be exempt from SSIC application by virtue of this OpNav instruction.

It is not clear how much effect this OpNav instruction actually has had, since it has not been uniformly adhered to for these exempted messages. Figure 1 shows the SSIC application rates for some of these exempted messages. The messages are represented by their SC values. The number at the top of each column denotes the SSIC application rate for that particular category. The numbers in parentheses represent the SSIC or flagword (or both) application rates and are discussed elsewhere in this report. The MilSTRIP messages in the figure originate at both operational and supply commands that do not use DAAS. Thus, the SSIC application rate for some of the exempt messages is essentially 100 percent; for others, it approaches zero.



a/ *Numbers denote application rates of nonzero SSIC or recognized flagword, or both.*

FIG. 1: SSIC APPLICATION RATES – MESSAGES EXEMPTED BY OPNAVINST 2100.1

An average of 35 percent of all exempt messages have SSICs, compared with 77 percent of the nonexempt messages. (Table 1 summarizes the number of messages in these different categories.) Consequently, the existence of this OpNav instruction precludes an accurate estimate of SSIC applicability to all the traffic -- that is, the percentage of traffic that does not have SSICs because of difficulty in applying the code. However, 23 percent of the nonexempt messages do not contain SSICs, and this figure is used as a first-order estimate.

TABLE 1

SSIC USAGE SUMMARY FOR YOM KIPPUR DATA BASE

	Number of messages	Number of messages with nonzero SSIC	Number of messages with nonzero SSIC or flagword (or both)
Entire Yom Kippur data base	6,265	2,633	4,835
Non-Navy originated	1,701	0	1,010
Navy originated	4,564	2,633	3,825
Exempt from SSIC by OpNavInst 2100.1	2,129	751	1,892
Nonexempt from SSIC	2,435	1,882	1,933

For the sake of contrast, more than 98 percent of all the messages had an SC assigned to them. Most of the uncodable messages had no English text and were purely numeric.

Figure 2 shows a further breakdown of SSIC application by major SC category. The first digit of the SC is used to determine each message's category, and the number at the top of each column denotes the SSIC rate for that category. The figure shows that intelligence is the worst category with only a 56-percent rate. The next lowest is environment, 79 percent, with all the rest at least at 80 percent; supply reaches 93 percent. Reasons for this behavior are covered in another section.

Another measure is the use of any subject indicator on a message -- either an SSIC or a flagword, or both. These rates are given in figures 1 and 2 and summarized in table 1; 77 percent of all messages and 84 percent of the Navy-originated messages in the Yom Kippur data base have some sort of subject indicator. Since only the flagwords listed in appendix B are counted (and our text-searching routine for identifying flagwords tended to

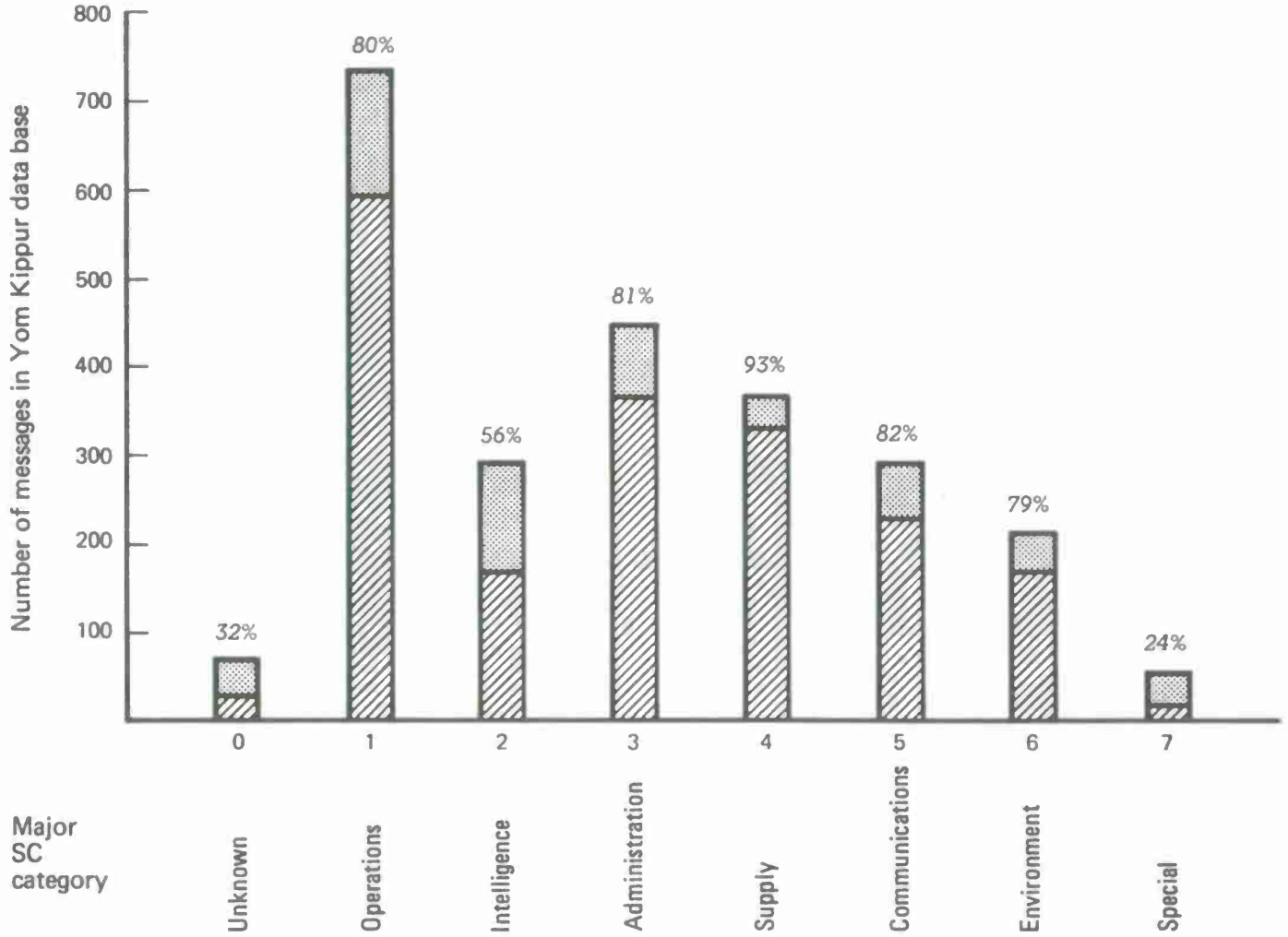


FIG. 2: SSIC APPLICATION RATES FOR NAVY ORIGINATED, NONEXEMPT MESSAGES

miss substantial numbers of them), these values should be treated as lower bounds. Since these rates are lower bounds, they support the argument that Navy and non-Navy message originators indeed use subject indicators.

ACCURACY

SSIC accuracy is reflected in the consistency and appropriateness measures. When there is a wide range of SSIC values for messages having similar contents, the SSIC is not consistently portraying the subject matter. Likewise, the SSIC used may simply be incorrect; that is, it could not reasonably be appropriate for the message. The question of inaccuracy caused by using vague or general codes instead of more specific ones is dealt with in the information-related measures.

Consistency

To measure consistency, some benchmark is necessary. Flagwords in the message subject line were used as datum points, and the various SSICs used with them were tabulated. The results were very consistent even with different originators. An SSIC was not always applied to messages containing flagwords; but when it was, it was done so consistently. The only flagword showing any significant variation was CasRep. And even then, instead of a 3040 operations SSIC, values from the logistics section were used.

Appropriateness

It is very difficult to measure degrees of appropriateness, so only obviously incorrect SSICs were considered. For example, a 4490 SSIC (material requirements, advance planning) was used on a message concerning anchorage assignments. The correct SSIC is 3171, so this SSIC was considered definitely inappropriate.

For the 1,000 or so messages considered, very few inappropriate SSICs occurred. Some of these could have resulted from transmission difficulties or errors in entering the values into the data base. Overall, there was no significant use of obviously incorrect SSICs. The tendency was to use a more general category SSIC.

INFORMATION

The information characteristic of a code has two facets: How much information is contained in the code, and what is the utility of this information? The amount of information is based upon a code value's probability of occurrence and is measured by entropy; the utility of the code depends on the use made of it.

To illustrate the distinction between the two, consider this example. Suppose there are two sets of 100 messages. One set has 90 messages with 3000 SSIC values and 10 with 3124 values. The other set has 10 messages with 3000 SSIC values and 90 with 3124 values. From a probabilistic viewpoint, each code set has two categories with .9 and .1 probabilities of a message being in one or the other category. The entropy of each code set is therefore identical. However, if the codes were used to internally route messages, the 3124 value would be much more valuable than the general 3000 code. Therefore, the second set of code values has greater utility even though both sets have the same amounts of information.

Entropy

Entropy is defined in appendix A; its application to message codes is thoroughly developed there and in the course of this report. For this discussion, it can be viewed as a useful coding measure because it quantifies some desirable properties of codes.

Suppose 10 different messages are encoded with two different codes. Intuitively, the code that gives the larger number of distinct code values for this set contains more information. If one code were to give all 10 messages the same code value, and the other code were to give each message a unique value, the latter code would give more information about the messages. Knowing just the code values, the latter code would tell you there are 10 different messages; the first code would not tell you whether the messages are different.

Another way to view this concept of information is to consider the relative frequencies of the code values. If the same value were to occur all the time, there would be no uncertainty and, therefore, no information in the code. However, if all the code values were equally likely to occur (for a given set of messages), there would be maximum uncertainty and a corresponding maximum amount of information in the code.

Entropy incorporates both these intuitive viewpoints -- number of distinct code values and probability of occurrence -- into quantitative measure. Consider all the messages in the Yom Kippur data base having an SSIC code in the 3000-3999 category (operations and readiness). The number of occurrences of SSIC and SC code values for these messages are given in figures 3 and 4, respectively. Only the number of times a value occurs is given, not the value itself. For example, in the first row of figure 3, the first SSIC value occurs 153 times, the second 11 times, and so on (see appendix E to identify which SSIC values these are). There are 222 different SC values compared with only 62 SSIC values, and the messages are spread more evenly throughout the SC values than the SSIC. (Four SSIC values have more than 97 occurrences, while no SC value has that many.) Not surprisingly, then, the entropy of the SC is 4.6, greater than that for the SSIC, 3.1.

153	11	121	97	6	82	7	32	78	32	2	10	2	39	74	9
22	3	2	1	40	8	6	1	4	10	4	4	5	1	24	11
1	2	1	28	2	1	38	13	13	2	77	3	8	112	1	11
1	2	2	1	1	1	1	1	1	1	1	3	1	1		

FIG. 3: NUMBER OF OCCURRENCES OF DIFFERENT SSIC VALUES IN THE OPERATIONS AND READINESS CATEGORY

10	1	5	7	1	4	10	11	1	1	3	1	5	4	2	4
14	3	5	1	8	2	1	3	3	1	1	2	3	17	3	14
1	11	1	40	2	1	1	5	14	3	3	2	9	1	1	1
6	1	3	1	4	1	1	1	2	1	1	1	1	1	3	11
1	1	1	1	1	14	6	7	1	1	1	6	1	1	1	6
1	2	2	3	2	2	1	2	3	11	3	5	5	2	1	10
3	19	13	1	1	1	1	1	1	3	1	2	2	6	1	2
21	1	17	1	13	7	90	28	33	18	2	8	1	15	5	1
3	6	17	10	8	1	10	10	3	15	5	2	3	1	4	4
26	11	53	3	2	1	1	10	1	1	1	5	1	1	1	3
1	1	1	1	1	1	1	2	8	1	1	1	1	10	9	1
6	1	3	2	1	2	1	20	10	1	1	2	2	3	3	5
11	3	1	3	1	2	1	1	15	2	1	1	1	1	1	5
3	2	11	2	84	17	3	16	10	1	2	1	1	7		

FIG. 4: NUMBER OF OCCURRENCES OF DIFFERENT SC VALUES FOR MESSAGES HAVING AN SSIC VALUE IN THE OPERATIONS AND READINESS CATEGORY

The different values of entropy for various sets of messages from the Yom Kippur data base are summarized in table 2. The rationale behind the choice of these sets is a desire to compare the SC main categories to the corresponding SSIC categories. Since there are fewer SC main categories, several SSIC categories correspond to one SC category. For example, the SSIC categories of logistics, ordnance, ships design, general material, and aero material correspond to the SSIC supply category.

TABLE 2

SSIC AND SC ENTROPY MEASUREMENTS

Set of messages from Yom Kippur data base whose codes are evaluated	Message subject code	
	SSIC	SC
All messages in data base	2.4	4.3
All messages with an SSIC	4.1	4.7
All messages with operations SSICs	3.1	4.6
All messages with communications SSICs	2.0	3.0
All messages with mil personnel, gen admin, medicine, fin mgmt, fac ashore, or civ personnel SSICs	4.0	3.4
All messages with logistics, ordnance, ships design, gen material, or aero material SSICs	2.8	3.0

The SC has a greater entropy for all the sets than does the SSIC, except the administration category. The main reasons for this behavior are the different distributions of code values throughout the main categories of the two codes. The SC has 838 possible, valid code values in its operations, intelligence, and environment categories. Taken together, these are the counterpart to the SSIC's operations and readiness category, which has 138 possible valid code values. Considering the emphasis that entropy places on unique values, it is not surprising that the SC operations codes have greater entropy. What is surprising is how well the SC does compared with the SSIC for the other categories. While the SC has 25 more values in the communications category (87 vs. 62), it has considerably fewer values in the remaining two categories (93 vs. 555) for administration-type categories, and 47 vs. 586 for supply-type categories. The entropy measurements for the administration-type categories only partially reflect this, while the supply-type categories are totally opposite of expectations.

The reason for this behavior is that the potential of the SSIC is not being utilized. The number of SSIC code values used is only a small proportion of those that are available; the relative utilization of the different SC code values is much higher. The frequencies of the different SC and SSIC values in the Yom Kippur data base appear in appendixes C and E, respectively.

When all the messages in the Yom Kippur data base are considered (messages without a code are treated as having a null value and then treated the same as a coded message), the SC has 79 percent more information. This value is an upper bound, since SSICs were not applied to the majority of messages in the base. However, it reflects the present amount of information given by the SSIC about messages in the Navy communications circuits.

The SC entropy for all the messages is less than that for just the messages with SSIC codes. The reason for this is that all the messages, viewed as a whole, are not as random as those with SSICs. The SSICs are exempted from 630 MGDATS (which are formatted intelligence messages), 537 DAAS-originated messages, and 300 communications service messages. Since the messages in each of these categories have identical subject codes, the codes contain relatively little information. Thus, the average amount of information (entropy) did not increase even though there was an increase in the number of code values.

Coding Level

Rather than get into subjective estimates of the utility of coding information, coding level is used here as an indication of this utility. Coding level measures the number of significant digits, and it is assumed that the more useful code values have higher coding levels.

There are five levels of coding possible using the SSIC: levels 0 through 4 with values 0000, X000, XX00, XXX0, and XXXX, respectively, where X represents any nonzero digit. A level 0 code means that no SSIC is assigned, and a level 4 code means that the SSIC has 4-place accuracy. Since there are 13 major SSIC categories, it is assumed that the leftmost digit can have a value between 1 and 13. That is, a 13051 SSIC has effectively the same level coding as 3051. Similarly, any zero to the left of a nonzero digit is treated as a significant digit. Thus, 3051 is a level-4 code, not a level-3.

The levels of SSIC coding for the Yom Kippur messages are shown in figure 5. Only the 2,633 messages containing SSICs are considered for the SSIC curve. For these messages, 72 percent had level-3 coding and 92 percent had level-2 coding.

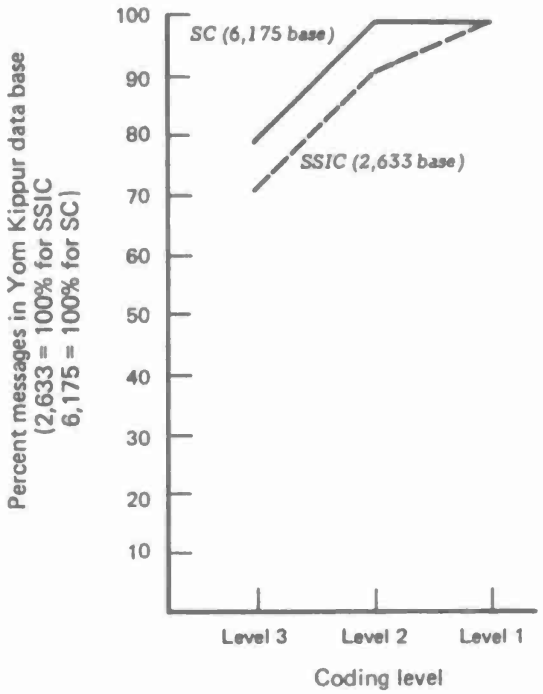


FIG. 5: CODING LEVELS OF SSIC AND SC FOR ALL CATEGORIES

By contrast, the SC had distinctly better results, even when more than double the number of messages was considered. All 6,175 messages with nonzero SC values were considered; 79 percent had level-3 coding, and more than 99 percent had at least level-2 coding. (There are a number of SCs with the form XX_X. These are assumed to be equivalent to XXX_ and assigned to level 3).

The significant difference in level-1 coding -- only 41 of 6,175 messages had just level-1 SC codes, vs. 218 of 2,633 for the SSIC -- implies that the SC had better defined subcategories. In other words, fewer subject codes are left at level 1 because the proper subcategory at level 2 is not clear. Similarly, 78 percent of the messages had at least level-3 SCs, vs. 72 percent for the SSICs. No comparison at level 4 is made, since neither code has a full set of fourth-position codes.

The contrast is even more dramatic when only messages with an operations category SC are compared (messages with a 1___ SC). There are 1,460 messages with such SCs, and 824 of them have SSICs. The coding levels are shown in figure 6. The clear superiority of the subject code at all levels is evident. It is particularly noticeable at level 3 -- 92 percent of the subject codes (1,342/1,460) have at least level-3 coding, vs. only 68 percent (557/824) of the SSICs. Again, the implication is that the SSIC does not have subcategories that relate to the operational traffic and, consequently, does not have as much utility (value) as the SC.

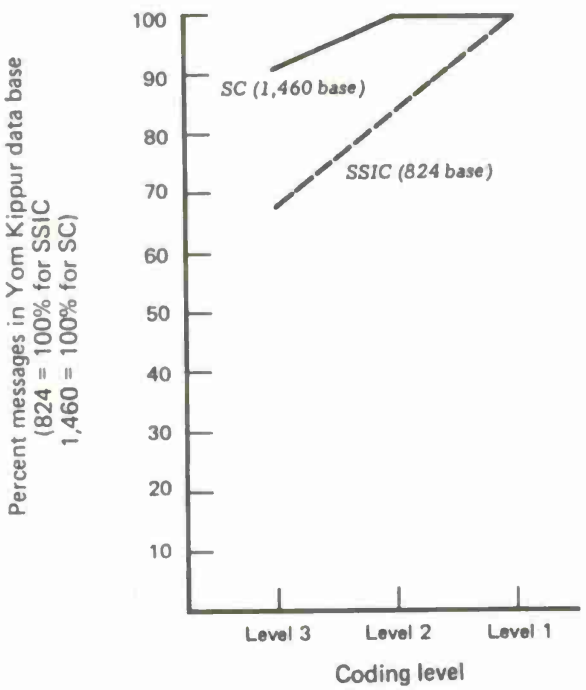


FIG. 6: CODING LEVELS OF SSIC AND SC FOR SC OPERATIONS CATEGORY

USE OF INTERNAL DISTRIBUTION

Thus far in this research contribution, usage, accuracy, and information of the SSIC have been measured. These measures have attempted to objectively and analytically evaluate the SSIC. Still another measure is the actual use made of the SSIC value on messages. The Navy's Local Digital Message Exchange (LDMX) offers an ideal testing ground, since it allows users to select which parameters should be used to route messages to them.

The LDMX can route automatically on the basis of Address Indicating Groups (AIGs), referenced messages (incoming or outgoing), flagwords, and the SSIC. The choice of which indicators to use and the order in which they are effective is up to the individual commands. When a command specifies that AIGs should be used before flagwords, internal distribution will be based on the AIG whenever it is found on a message. Only when an AIG is not found will the LDMX use the flagword-based internal distribution. When none of the parameters is found, or when there is an error in the message header, manual routing is used. Consequently, actual use of the various parameters indicates how the users value the SSIC.

Table 3 summarizes the various parameter usage rates for LDMXs at the Pentagon (OpNav) and at Crystal Plaza and Hampton Roads, Virginia. These three LDMXs handle

different types of traffic -- the Pentagon and Hampton Roads are operationally oriented, and Crystal Plaza is more administrative in nature.

TABLE 3

PERCENTAGE OF MESSAGES INTERNALLY ROUTED BY VARIOUS LDMX METHODS

Method used to internally route messages	LDMX SITE		
	Pentagon	Crystal Plaza	Hampton Roads
SSIC	<1	34	22
Flagword	50	35	45
AIG	2	1	3
Reference	5	4	5
Drafter distribution (data pattern, comm service, SpeCat)	13	12	10
Manual[a]	30	10[b]	15

[a] Messages are manually routed when none of the above parameters is found on a message, or when there is an error in the message heading.

[b] 80% of the manual routes at Crystal Plaza are based upon the SSIC.

For the operations-oriented Pentagon traffic, the SSIC is not used. (Only 16 out of more than 54,000 incoming messages in December 1974 were routed on the basis of the SSIC.) However, at Crystal Plaza, the SSIC is used for over 40 percent of the messages, and it is the most popular of the indicators. Perhaps more Navy-originated messages (hence, more messages with SSICs) are received at Crystal Plaza than at the other locations. Flagwords are used uniformly throughout these LDMXs.

Two conclusions can be drawn from this table. The SSIC does not relate to operations-related messages, as evidenced by the total lack of its use at OpNav; and flagwords are used more often than the SSIC to denote the desired distribution, even though the main purpose of the SSIC is to aid internal distribution.

DISCUSSION

All the measures indicate that the SSIC is not well-designed for operational messages. Its application rate is lowest for these messages. The SC categories of operations, intelligence, and environment fall into the SSIC category of operations and readiness, and figure 2 shows that these three SC categories (ignoring the special messages category) have the lowest SSIC application rates. The SSIC's accuracy is satisfactory, but the information rate and coding level for operational messages are again the worst of all the categories.

In summary, the SSIC is a concept that is not reaching its potential. It is used to aid internal distribution, but, at best, more than 50 percent of the messages are routed by other means for the three LDMXs considered. A significant proportion of the SSIC values never occurred in the Yom Kippur data base. Figure 7 shows a breakdown of SSIC occurrence by major category. Obviously, only three categories are utilized, while the information potential of the others is wasted. Appendix E gives a detailed breakdown of SSIC use within these major categories. Better design of a subject code allow increased use of the information capability of a code. But before discussing these design questions, some of the potential uses of a good message subject code are considered.

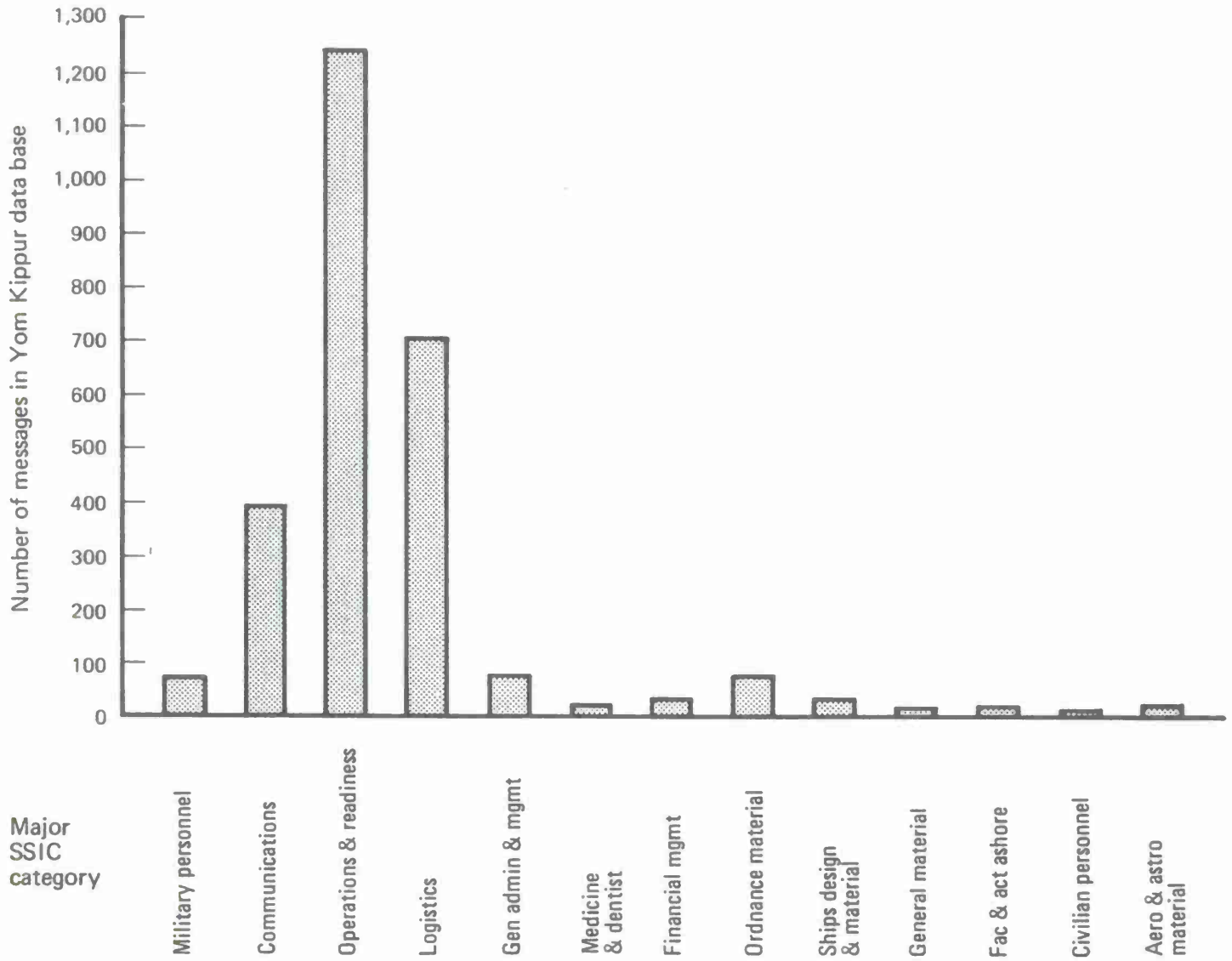


FIG. 7: SSIC OCCURRENCE BY MAJOR SSIC CATEGORY

POTENTIAL USES OF A MESSAGE SUBJECT CODE

DATA BASE FORMATION AND MESSAGE RETRIEVAL

An accurate subject identification code on a message would ease data base formation, since the messages could then be automatically scanned for subject matter and incorporated into data base when desired. The data base could be kept current with minimal effort. Since all the relevant messages could be scanned, the data base would be accurate.

Systems such as the Naval Communications Processing and Routing System (NavComPars) and the LDMX maintain journal tapes containing all the messages processed by them during a given time (usually 6 months). Message files could be built from these tapes by the commands serviced by the NavComPars/LDMX, and messages could be retrieved from these files on the basis of a subject code. If these retrievals were timely and comprehensive, the commands would not need to maintain as many duplicate and manpower-intensive message files as they now do.

New programs -- such as the Remote Information Exchange Terminal (RIXT) and the Consolidation of Telecommunications on Oahu (COTCO) -- should further reduce response time, making these computer-based message files even more attractive. A message subject code is then simply another means of accessing these files, and it may help in further processing the information.

Consider the naval status of forces reporting systems. Formatted messages such as NavForStats (naval force status), EmpSkeds (employment schedules), CasReps, and MovReps deal with the status of forces. Various commands in a fleet will receive copies of all these types of messages and maintain separate files using them. In addition, Navy-wide files of these reports are maintained. However, the Navy-wide files are not as current or accurate as the command files because of time delays in entering the messages into the system and inaccuracies in the reports themselves. The fleet commands will check out inconsistencies to ensure accuracy.

But there is quite a bit of duplication of effort in maintaining these files. If instead the NavComPars/LDMX servicing the fleet were to give prompt, comprehensive retrievals based on subject matter, some of these files would not need to be separately maintained. A search for all messages affecting status of forces could be done regularly, thus improving accuracy with minimal effort. (This will remain true even when the Composite Reporting System, ComPrep, becomes operative.) Ships leaving for sea could verify that any files they have on board are up to date. Similarly, commands could ensure that their manuals are up to date by appropriate searches of the message traffic.

When a ship enters a new command, there can be a time lag until the command has enough background information to more fully ascertain the ship's status. Procedures could be implemented using the message files to reduce this time. For example, if the ship had always included its operational commander as an addressee, it could request the NavComPars/LDMX to forward its most recent force status messages to its new command.

These message files need not be maintained necessarily in the NavComPars/LDMX. With NavMacs (Naval Modular Automated Communications Systems), the ships potentially will be able to have their own computerized files on board ship.

By the late 1970s, the Navy's automation programs may have matured to the point where units may be able to talk directly to the Worldwide Military Command and Control System (WWMCCS), in addition to the NavComPars/LDMX. When the response times of WWMCCS are too slow, the NavComPars/LDMX/NavMacs may offer a workable command and control alternative. A message can be viewed as a command and control unit and be operationally useful because of its retrievability. Responsive data bases for day-to-day use by the fleet could be maintained through the NavComPars/LDMX/NavMacs, while WWMCCS would maintain more comprehensive, longer-term files suitable for trend analysis, reconstruction, "big picture," and planning considerations.

The key to the usefulness of messages as command and control units is their retrievability. A good subject code adds a significant dimension to this retrievability. See appendix F for evidence of the desire by users, such as the Navy Command Support Center, for the techniques discussed in this section. That appendix contains a CNO memorandum requesting that the requirement to automatically process and file narrative messages be validated. There is an explicit request for file retrieval by subject. The need for a message subject code follows accordingly.

TRAFFIC MANAGEMENT

If message subject codes were actually used, it would be possible to monitor the traffic content over communications channels. With NavComPars, a near real-time display of this information is possible. This capability would give a new dimension to managing communications channels and to the command and control of operating forces using them. For example, screening boards could monitor the precedence levels on the channels and relate them to the subject matter. Abuses of the precedence system could be reduced and new precedence assignment instructions determined in real time. (Each operating area could have its own set of precedence instructions as determined by the operational command.)

Consider what the situation was in the Mediterranean on 25 October 1973. Table 4 gives a breakdown of the precedence levels by general subject category for the messages contained in the Yom Kippur data base. Of the 100 flash operations messages, 68 concerned Air Force-originated schedules for the airlift to Israel. A high percentage of the flash messages, 48 of 176, were communications related. Table 5 shows further breakdown of these messages. It shows the large number of flash communications services messages (33 messages fall into the 51 __ category.) Further checking reveals that most of these flash service messages resulted from airlift messages. Consequently, about 57 percent (100 of 176) of the flash traffic was specifically airlift-related. This amount of flash traffic considerably slows the speed of service of lower-precedence traffic. The resulting delays could prove serious enough for the precedence instructions to be altered.

The above kind of information would aid such decisions. For example, if the naval situation on 25 October had reached a point where speed of service for Navy operational messages was of vital concern, these messages would really have had higher priority than the airlift messages, at least on Navy communications circuits.

But precious time could have been lost in clearing the Navy circuits. An automated system based on subject codes would allow a screening board, staffed by Navy officers with the proper authority, to monitor the situation and, if necessary, help them in their job of screening the traffic. Without a subject code, if would be much more difficult to filter the messages. Obviously, all Air Force-originated messages could not be delayed, but the board could decide to delay all those concerning the airlift.

In addition to monitoring the precedence levels, future screening boards may be required to reduce the amount of traffic to the fleet to a more manageable level. With the increased capacity of the new communications satellite circuits, traffic may grow beyond the capability of the ship-based staffs to effectively absorb it. Good message subject codes would make these screening boards more effective (see reference 2).

INTERNAL MESSAGE DISTRIBUTION

Finally, there is the problem of message distribution -- how to ensure that people obtain necessary information without burdening them with superflous information. There are two conceptual approaches: extract the content of the message and distribute on the basis of this content, or directly indicate the distribution desired. Use of the first concept assumes that once the content is known, proper distribution of the message follows. Use of the second concept assumes that the originator knows the proper distribution.

In practice, the Navy uses a combination of these two concepts. The originator is expected to list the addressees but not necessarily local distributions within the addressed commands. In the automated world, the LDMX will assign the local distribution using a

TABLE 4

PRECEDENCE BY CONTENT BREAKDOWN FOR 25 OCTOBER
MESSAGES IN YOM KIPPUR DATA BASE

Precedence	Operations	Intelligence	Administration	Supply	Communications	Environment	Special	Unknown	Total
Flash	100	8	7	3	48	4	1	5	176
Immediate	335	220	50	35	260	23	8	6	937
Priority	248	210	121	461	195	78	16	15	1,344
Routine	99	72	170	85	116	12	9	10	573
Unknown	1	0	0	0	0	0	0	0	1
									3,031

TABLE 5

DETAILED BREAKDOWN OF 25 OCTOBER FLASH COMMUNICATIONS
MESSAGES IN YOM KIPPUR DATA BASE

	General services	Changes/ corr	ZDK request to originator	Broadcast requests	Misroute action	ZAT/ZDK replies	Routing	Link 11/14 support	Special message tests	Total
Subject code:	5100	5120	5130	5140	5150	5160	5300	54CD	5620	
Number of flash communications messages	14	2	1	3	12	1	1	1	13	48

variety of indicators. A search is made for AIGs, referenced messages, flagwords, and the SSIC. When an AIG is found, the message is given the same distribution as other messages with the same AIG. Likewise, a message is given the same distribution as the referenced message it contains. Flagwords and the SSIC are content indicators, and local distributions are assigned on the basis of this content. The choice of which indicators to use (that is, their priority) is up to the individual commands.

There are some problems with these procedures. In a sense, use of AIGs and references to indicate distributions are direct distribution concepts, but they are really only useful in providing consistency once the original distribution is decided. By themselves, they do not indicate the correct original distribution. A sizable amount of manual intervention is still needed because often none of the indicators is found on a message (see table 3). This manual intervention is undesirable because it can be time-consuming and inconsistent. If a message subject code were always used, the manual intervention would be reduced.

However, distribution procedures based solely on codes will encounter the problem of attaching levels of importance. Travel arrangements to a ship for an admiral and an enlisted man may have identical content codes, but their desired distributions will differ. A supply message may have operational significance or be just logistics. Its content is the same, but its relative importance and resulting distribution shift.

As a result, any automated distribution assignment procedure may require a combination of direct distribution and content-based distribution concepts for effective operation. Effective application of a good message subject code by itself may not solve the message-distribution problem. The idea of directly specifying the type of local distribution through some sort of code along with a subject code is worth considering. For example, the use of a VIP keyword along with the subject code on the admiral's travel arrangements could alert the LDMX that a special distribution is required. Or writing "Senior Ops" after the subject code on the supply message would denote that a high-level operations officer should see the message.

Another feature worth considering is for the originator to place his office code along with the subject code. Knowing the originator's office code could aid both internal distribution and assignment of a distribution code to any reply message. This idea has been used in the CincPacFlt area, apparently with some success.

The potential savings from improving these routing procedures are significant. There would be a reduction in the communications center effort, since fewer messages would need to be manually processed. The improvement in overall quality would save time and effort spent correcting misroutes and, more significantly, cut down the number of messages "shotgunned" to the staffs.

While the misroute problem can be serious, the daily flooding of staffs with messages poses an unnecessary workload. For example, if an LDMX were to receive an average of 2,500 messages a day, and distribute 50 copies of each message and if it would take 6 seconds to scan each copy and one-third of the copies are of no interest to the reader -- that is, they are scanned and discarded -- then about 70 hours a day, or 9 men, are wasted scanning the messages. (The input volume and number of copies are representative for the Naval Telecommunications Center at Hampton Roads.) Obviously, even a small reduction in the number of superfluous copies would yield significant savings in staff workload. This ignores the savings in paper costs and distribution effort.

CHARACTERISTICS AND DESIGN OF A GOOD SUBJECT CODE

To realize the benefits that could be achieved from a good subject code, an organized approach is needed. In this section, the basic characteristics of a good subject code are restated to serve as design goals, the measures summarized and finally code design considerations discussed. This section is more philosophical than the preceding ones; its aim is to structure a point of view for designing message subject codes.

CHARACTERISTICS

A good subject code exhibits three basic characteristics:

- It is used.
- It is accurate.
- It contains worthwhile information.

A code is used when the message drafters can find the proper value with reasonable effort, as opposed to omitting it entirely or using some general category by default. A code is accurate when it gives the best indication of the message's subject matter (within the limits of the code) and there is consistency among users in its application. And a code contains worthwhile information when it aids in some function, such as internal distribution or traffic management.

The first two characteristics concern application of the code to all the messages; the last concerns the value or utility of the code once it is on the messages. For example, when all ship-scheduling messages are consistently given the most appropriate subject code value, the code is both used and accurate; and when this code value improves internal distribution, it is worthwhile. A measure of how much information the code actually contains is covered in the next section.

MEASURES

The extent to which the previous characteristics are present are indicated by these measures:

- Application rate.
- Consistency.
- Appropriateness.
- Entropy.

- Coding level.
- Actual Navy use.

Application rate, which is the percentage of messages under consideration that contain a subject code, partially measures the usage of a code. Use of general category codes as a default is reflected in the entropy and coding level measures. Consistency measures the percentage of identical messages that should have been assigned the same code value, while appropriateness reflects the ability of the encoders to select the most suitable code value for the given message. Together, they measure the accuracy of a code. A code may have no really good value for a particular type of message. This will be reflected in the information-related measures. The accuracy measures simply show how well the drafters can find the best available code value.

The last three measures concern the worthwhile information characteristics. This characteristic has two facets: How much information is contained in the code, and how valuable is this information?

Considering the first facet, if each message were viewed as an information unit, the messages would have an inherent amount of information, or so-called entropy (see appendix A). The codes assigned to a set of messages can have no more information than the messages themselves. (They can, but only when the codes are incorrectly assigned.) Ideally, the codes would contain the same amount of information. But this is difficult to achieve, since the amount of code information is reduced whenever two different messages are assigned the same code value. Thus, the entropy of a code depends upon two factors: the inherent information in the messages themselves, and how much of this information is contained in the code.

If it were possible to measure the inherent entropy in the messages, it would be possible to compare it with the code's entropy and measure the code's effectiveness. Unfortunately, there is no way to do this. (If it could be done, it would imply a perfect code.) The task is then reduced to comparing entropy levels for different codes applied to the same message sets. The code that has the greater entropy obviously has done a better job in relaying the information inherent in the messages. The actual code values are irrelevant in measuring the entropy of a code; they only serve to distinguish different categories.

Utility of the information in the code depends on how the code is to be used -- for example, internal distribution, traffic management, or data base formation. Each use may place special premiums on certain types of traffic. In addition, utility varies between users. For example, a numbered fleet command would be more interested than a systems development command in detailed breakdowns of operations traffic.

The last three measures relate to utility or value of a code. Coding level measures the number of significant digits in the applied code values. The number of digits is assumed to be directly proportional to utility. When the operators find it worthwhile to have it on a message, then, by definition, it has some utility.

DESIGN

Given these measures and how they relate to the desired characteristics, it is possible to consider some of the tradeoffs in designing a good message subject code. The designer has control over four features of a code:

- Total number of unique values.
- Distribution of these values throughout the subject categories.
- Definition of each value.
- Structure of the code.

The design objective is to select the proper combinations of these variables that result in good subject codes, as defined in the previous two sections.

A basic tradeoff is between the total number of unique code values and the ease of applying the code. Many unique values, while they permit the code to contain more worthwhile information, can prove cumbersome. The net effect can be a code that is hard to use; if so, it would be poorly applied and, in practice, would probably not contain much information. The use of general 3000 SSIC codes is an example.

But a proper code structure can ease the use of many unique values. For example, the SC operation's category has 784 unique values, but apparently it is not harder to apply than the SSIC operations and readiness category, which has only 138 values. Thus, the designer needs to compromise between ease of use and accuracy and the number of unique values that can be supported by the code structure. For example, concentrating MilSTRIP messages in one code value may reduce the information level (entropy) of a code, but it will ease application.

The second design feature is the distribution of code values throughout the subject categories. A code's entropy or information is maximized when the probabilities of the unique code values are equalized. The designer strives to do this by allocating the most code values to those subject categories containing the most messages. The implications of this approach are significant: a good subject code must be tailored to the type of traffic encountered. If a subject code were to be designed for general Navy use, the average (over all the Navy) message traffic profile by subject should be formed and code values allocated to subject areas on the basis of their relative populations.

For example, if 30 percent of the traffic were in operations, 30 percent of the code values should be in operations. Of course, this would be true only when all categories have equal emphasis. In practice, it may be desirable for some categories to have proportionally more values so their codes would contain more information.

What is better -- more unique values or more equal probabilities for these values? For example, suppose there are 10 messages to be encoded. When a code results in four unique categories with probabilities .7, .1, .1, and .1, its entropy is .94; a code with only three unique categories having probabilities .3, .3, and .4 has an entropy of 1.09. However, if another code were to give five unique categories with probabilities .6, .1, .1, .1, and .1, its entropy would be 1.23, the largest of all. In practice, ease-of-use considerations will limit the number of unique values, and the designer will then try to equalize the probabilities.

One more point should be made. When code values are not used, they do not increase the information level of the code; they only serve to make it more difficult to use. There is a large number of SSIC values that never occurred in the Yom Kippur data base. Admittedly, this data base is operationally oriented; but if this trend were to continue on a larger scale, it would be a strong argument for eliminating the unused SSIC values.

The final design features are the definition of the code values and the selection of a code structure. These are obviously important steps, since they are how the designer ensures that the values will be assigned as intended. Poorly defined values and a poor structure will result in inaccurate application and different probabilities than expected. Proper definition and structure also ease the application.

A well-structured code will have a few major categories with as little overlap between them as possible, yet be comprehensive enough to cover all subjects. Within these major categories, subcategories based on functions and subject areas could be established. A hierarchial structure like this allows similar types of messages concerning different subjects to be grouped together. For example, supply messages concerning inventories could be in the same subcategory with the next level differentiating the material inventoried, such as general stores, munitions, etc. This arrangement should improve accuracy by enabling the user to easily specify a general functional category without necessarily knowing the detailed subject areas for the message.

However, proper definition of the subject areas can simplify the search. For example, many messages are sent to fulfill a reporting requirement. Either a subject code should be indicated when the report format is given, or the subcategories should be set up to take advantage of the fact that it is a standard report. This is the case when flagwords are used to denote subject matter. The format for a movement report is given in the Navy publication NWIP-10, which specifies that the flagword MovRep is to

be used. Alternatively, a subject code could incorporate the fact that movement reports are required and have a particular subcategory established for them.

Finally, a good code structure can support many unique code values that increase the information in the code without sacrificing ease of application.

ALTERNATE SUBJECT CODE

The SC, listed in appendix A, is proposed as an alternative to the SSIC. It has seven major categories in a hierarchial structure. For example, all supply messages are contained in one major category with four subcategories distinguishing the common supply subject areas. The code relates to the reporting requirements and contains flagwords and keywords, which ease encoding and provide consistency between users.

USAGE AND ACCURACY

Some experience has been gained in applying this code. It has its origins in previous OEG studies concerning Naval communications, and it has been used to encode substantial numbers of Navy messages. More recently, it was used to encode the 6,265 messages in the Yom Kippur data base.

This latter experience indicates that it is a good subject code; it was both used and it was accurate. It was ultimately used on more than 98 percent of the Yom Kippur messages.

Two passes through the messages were necessary to achieve this usage rate. On the first pass, 93 percent were encoded, with no code being assigned to the remainder. During the second pass, 8.3 percent had their codes changed from the original assignment. Some care should be taken in interpreting these usage rates since it was not an operational situation and the encoders did not draft the messages or even talk to the drafters, but simply were presented with the messages to be encoded. They knew that a second check of the codes was to be made, so they tended to skip a message unless they were sure of the proper code. Finally, the encoders did not have much operational Navy experience. Consequently, most of the resulting corrections were whole groups of messages (for example, MGDATs) that had not been previously recognized.

The application was consistent when flagwords are used as the benchmark. When a flagword was recognized by the coders, they consistently found the correct SC value for it.

INFORMATION

The entropy levels for the SC on the Yom Kippur messages are given in table 2. Even though it has fewer unique values (1,069 vs. 1,356), the SC still has much more information than the SSIC. For the operations and communications messages, the SC contains 40 and 50 percent, respectively, more information than does the SSIC. For these categories, the SC has many more unique values than the SSIC, but its structure is such that its application is not difficult.

The superiority of the SC carries over into utility measures. Its coding level is compared with the SSICs in figures 5 and 6. Again the SC dominates, particularly in the operations type messages.

The SC category utilization in figure 8 sums up the argument. Contrast this with the SSIC breakdown in figure 7. Considering the number of values in each major category, the SSIC does a much better job of spreading its values throughout the traffic. Figure 8 covers all the Yom Kippur messages, both Navy and non-Navy; figure 7 covers only Navy-originated messages.

The experience gained in using the SC for encoding the Yom Kippur messages has not yet been fully utilized in modifying the code. This experience has shown that the basic structure is good, but that some specific subcategories are ambiguous. For example, when should a 11CE code (air transport schedules) be used instead of a 151 code (unit movement schedules)? Cross checks between the SSICs and subject codes are being made to identify other ambiguities. In addition, some of the code values were never used. Decisions will be made on eliminating some of these values from the code. Finally, the categories should be renumbered to conform with the standard staff codes (N1 = administration, N3 = operations).

While these minor modifications will improve this code, there are some other questions of operational concern. How should a multicontent message be coded? Since some messages will deal with separate subjects, it seems that multiple codes are necessary. Is a purely numeric code the best type? Flagwords and codewords are now used to subject code messages. They have the advantage of being easy to remember, and they have enough redundancy so that one or 2 characters can be wrong and the word still recognized. However, large numbers of flagwords and codewords can be cumbersome. A numeric code such as the SC allows greater detail even with a large number of categories. Precise areas can be delineated. But an error in any character can totally alter the meaning.

All these questions have many answers, and it will require further testing and evaluation to identify the correct ones.

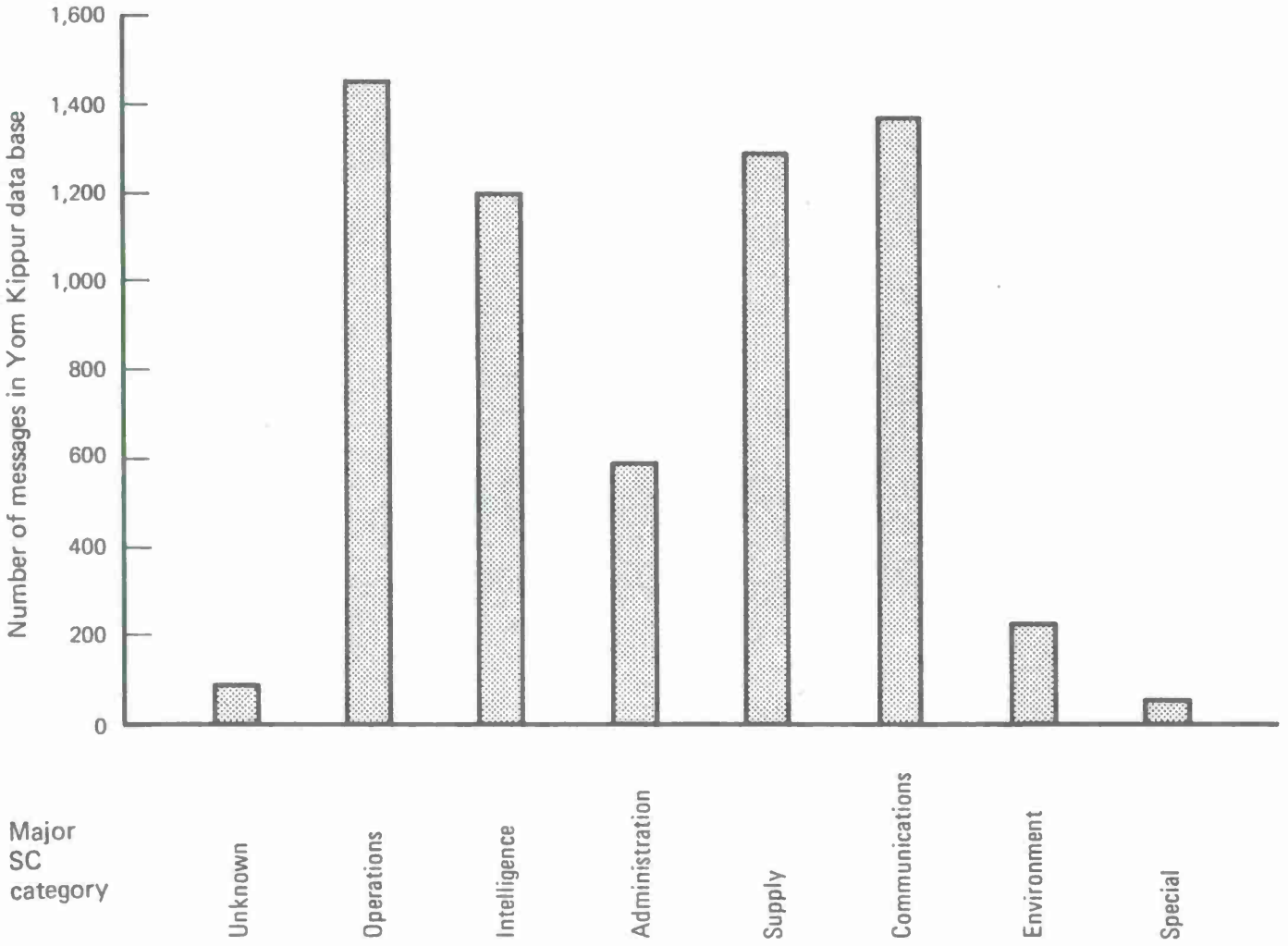


FIG. 8: SC OCCURRENCE BY MAJOR SC CATEGORY

JOINT SERVICE MESSAGE CODES

Telecommunications centers are being consolidated, and there is an ever-increasing need for message codes applicable to joint service use, particularly for internal routing. Viewing flagwords as a form of subject codes, there are two basic candidates for these joint service codes: subject codes and office codes.

The first problem is how to extend these codes for the joint services. There is a straightforward way to do this with the SC. Let the major categories be identical throughout the services, and let the subcategories be service-specific. A field can be added to denote the service to which the subcategory applies. For instance, a N11KB code can denote the general category of operations, force activity, nonexercise, and the specific Navy subcategory amphibious planning. The Army could use the characters "KB" to denote a different operations subcategory and identify it as Army by the letter "A" in the code A11KB. Extension of office codes to joint services requires either similar staff codes among the services, or for the communicators to thoroughly understand the staff codes so they can transform an originator-designated staff code into the proper addressee office code.

Once the procedures are established so that these codes can be extended to the joint services, testing and evaluation can be performed and the methodology developed in this research contribution can be applied to quantify the code-selection process. Usage and accuracy can be measured and compared for the different codes. The amount of information can be measured by entropy. But if multiple codes were used on a message, each different combination would be a unique value.

For example, if an average of 10 office codes were used on each message, and if each code were to have 30 possible values, there would be at least 30^{10} possible combinations. There would be even more if the different addressees were associated with the codes. Hence, even though a single subject code has many more possible values, the multiplicity of office codes may yield more information. (This suggests a normalized entropy to measure the information per code value.)

Utility of the information will be much more difficult to measure. Coding levels can be used, but with the understanding that the numbers of significant digits are not directly comparable; that is, the utility of 3 significant subject code digits may not be the same as 3 significant office code digits. Most likely subjective estimates of utility will be necessary because of the difficulty of proper testing.

The usefulness of office codes in traffic management or data base formation is not clear. It may be that certain patterns of office codes will imply the subject of the message and thus be useful for these tasks. Subject codes seem to be more versatile, since they are directly applicable to the above tasks as well as to internal routing and use in the

message header line. A subject code could be used instead of the Content Indicator Code in the Autodin header line, whereas only one or two of the office codes on a message could fit into the 4-character slot. Only testing will tell whether combinations of office codes are just as satisfactory.

In addition to evaluating subject codes (including flagwords) and office codes, hybrid codes using flagwords, office codes, and subject codes should be analyzed. In effect, a design effort in conjunction with an evaluation is proposed.

The outcome of such an effort would be procedures for obtaining uniform coding between the services; a single code, a hybrid, or simply transformations between codes could result. For example, patterns of office codes could be transformed to subject codes in much the same way as an LDMX now transforms subject codes to office codes. The code that contains the most information (entropy) should be applied and then automatically transformed to the necessary type of code.

The key is that the methodology introduced here forms a quantitative basis for this effort. Once the designers decide how to weight the different measures (for example, effort required to apply one subject code instead of many office codes for a message vs. the code value's relative usefulness), the codes can be evaluated and compared directly.

CONCLUSIONS

The first conclusion that can be drawn is that the SSIC should be abandoned and a new message subject code used. The SSIC in its present form is simply not used effectively by the Navy, and the potential benefits of accurate subject coding are not being realized.

The SC is a potentially usable alternative. It has been used to encode a sizable number and variety of messages. Its basic structure is such that it could be applied to more than 98 percent of the messages with a good deal of accuracy. It needs some fine tuning and interaction with fleet users. A test program should be initiated to provide this fleet input to the code in addition to feedback on the virtues of flagwords, multicontent codes, numeric vs. alphabetic, etc.

The new code should be dynamic, changing in response to users' needs. However, if its initial version were not acceptable, this essential feedback process would never get started. Hence, the objective of the initial test program should be to ensure that any new subject code has the basic features necessary to gain initial acceptance.

Once the new code is in use, a continuing test program could keep the code tuned. Frequency of the different code values can be monitored along with the use made of it for internal routing. Values not used would be periodically deleted and emphasis (that is, more code values) placed on the categories of traffic most frequently occurring. This way, the code would be continually tailored to the type of traffic encountered and thus keep pace with the changing needs of the users.

Ultimate acceptance of a subject code does not rest with the code itself, however. The user must obtain some benefits from its accurate application. If improved distribution, more thorough message searches and retrievals, or reduced file maintenance were attainable through use of the code, there would be incentives to use it. However, if the majority of the message originators were to perceive no positive benefits, the code would be simply another burden on them and would be paid lip service only. The SSIC is an example of this. It is not effective, and one of the reasons why this is so is that the users see no tangible benefits from its use.

Consequently, in conjunction with any testing to evaluate the code, there should be an effort made to ensure that the users obtain some tangible benefits from its use. In today's automated world, this means designing (adjusting) systems such as NavComPars, LDMX, or the Fleet Command Support Center to utilize the information the code gives them to better serve the Navy.

REFERENCES

1. CNA Memorandum, CNA-2001-74, "Yom Kippur Data Base," Thomas L. Oberlin, Unclassified, 17 Dec 1974

2. Center for Naval Analyses, Memorandum OEG-0652-71, "Preliminary Analysis of Broadcast Communications during ROPEVAL 3-71 (U)," Confidential, 12 Oct 1971

3. Center for Naval Analyses, Memorandum OEG-0273-72, "Analysis of Broadcast Traffic Composition during ROPEVAL 3-71 (U)," John R. Fish, Confidential, 13 Apr 1972

4. CNA Memorandum, CNA-01349-72, "NCS Guam/MCS Morocco Circuit Loading and Traffic Composition Comparison (U)," John R. Fish, Confidential, 13 Oct 1972

APPENDIX A

ENTROPY AS A MEASURE OF CODING INFORMATION

Entropy is commonly used as a measure of uncertainty in statistical mechanics and communications. This appendix attempts to give the reader an intuitive feeling for the information theoretic approach to entropy, and then develop the rational behind its application to message codes. In particular, it shows why the code with the maximum entropy is the best code from an information point of view.

Consider an example to gain some appreciation of the usefulness of entropy. Suppose there is a set of 100 messages and two different codes, A and B, applied to each message. Let the codes have 2 and 10 values, respectively, and assume code A has 90 and 10 messages in each of its categories whereas code B has 10 messages in each category.

Code B tells you more about the messages; when you know only the codes, code B tells you there are 10 different messages, code A lumps them into two types. Furthermore, if you were to randomly select a message and look at its A code, 90 percent of the time it would have the same value, giving you little new information.

Entropy can be viewed as just a quantitative measure of the average amount of information each code gives you. In this example, code B gives more information than code A, but it is often not so clear-cut. Suppose code C has 20 categories; four of them have 21 messages each, and the remaining 16 categories have one message each. Entropy is useful then because it shows that code B gives more information, on the average, than code C.

BACKGROUND

Consider an experiment that has an outcome chosen from a set of possible alternatives (a_1, a_2, ... a_k). This set of outcomes is called the sample space; each outcome occurs with probability p_1, p_2, ... p_k, respectively. The probabilities are all nonnegative and sum to one. The sample space and probabilities are called an ensemble, and are denoted by a capital letter; a general outcome is denoted by the same letter, but lower case. For example, for an ensemble X, the probability of an outcome x is denoted by $P_X(x)$. When $x = a_1$, then $P_X(a_1) = p_1$.

The purpose of these definitions is to prepare for a definition of entropy. For a given ensemble X, the entropy, H(X), is defined as:

$$H(X) = -\sum_{k=1}^{K} P_X(a_k) \log P_X(a_k)$$

$$= -\sum_{x} P(x) \log P(x) , \qquad \text{(A-1)}$$

where the base for the logarithm is commonly 2 or e. This paper uses e exclusively. The entropy is defined for an ensemble, which consists of a set of outcomes and their probabilities.

This function, H(X), has a number of properties that make it a reasonable measure of uncertainty in the outcome x. First, H(X) = 0 if and only if one of the probabilities $p_1, p_2 \ldots p_k$ is one, and all the others are zero. This is reasonable since there is no uncertainty in the outcome; only one value will ever occur. Conversely, H(X) takes its maximum value, log K, when all the values are equally likely; that is, $p_1 = p_2 = \cdots = p_K = 1/K$. Again this is reasonable, since there is maximum uncertainty when any outcome is equally likely to occur. Finally, H(X) is always greater than or equal to zero. Entropy can thus be viewed as simply a quantitative representation of these intuitively reasonable properties.

Uncertainty and information are related in that the more uncertainty there is in an experiment, the more information is contained in its outcome. For example, if a coin were biased so that heads comes up 99 times out of 100, there would be little uncertainty in the outcome of an experiment that consists of tossing the coin. Usually the outcome is just what you expect, and you get little information from it. Thus, the larger the uncertainty, the larger the amount of information obtained by removing it.

APPLICATION TO MESSAGE CODES

To apply the concept of entropy to messages, it is necessary to assume that all the inherent information in a message can be codified -- that is, all the information in a message's originator, addressees, date-time-group, subject matter, office codes (if any), etc., can be represented in a single code value. We assume that such a code exists, but not that we know the form of the code or its values.

In theory, then, the entropy of the ensemble formed by this supracode and its probabilities of occurrence exists, even though we cannot evaluate it. We denote this ensemble by X. The probabilities of the code values depend on the type of messages considered, so that there is an underlying entropy for any given set of messages.

In practice, we end up assigning messages codes such as subject codes, office codes, and date-time-group-originator codes. Let Y denote the generic ensemble formed by the set of assigned code values and their corresponding probabilities of occurrence. The entropy of this ensemble H(Y) can be evaluated using equation A-1. We have done this for the SC and SSIC by using their values and estimating the corresponding probabilities from the relative frequencies of occurrence in the Yom Kippur data base. (For example, if SSIC code value 3124 were to occur 78 times out of 2,633, it would be assigned a probability equal to 78/2633. This is done for all the different values and the SSIC entropy evaluated using equation A-1.)

The question is: How well do these assigned code values represent the actual messages or, in terms of our notation, given y for a message, what do you know about x? What you would like to do is choose the assigned code so that you have a maximum amount of information about the supracode. The measure for the information that y gives about x is I(x;y), where

$$I(x;y) = \log \frac{P(x/y)}{P(x)} \quad . \tag{A-2}$$

When this is averaged over x and y, the average mutual information I(X;Y) is formed:

$$I(X;Y) = \sum_x \sum_y P(x, y) \log \frac{P(x/y)}{P(x)} \quad . \tag{A-3}$$

Thus, the design goal is to choose a code so that the resulting ensemble Y maximizes I(X;Y). We shall now see that this implies maximizing H(Y) subject to the constraint that the assigned codes, y, accurately portray x.

If the joint ensemble XY is considered to be a single ensemble whose elements are xy pairs of the joint sample space, the entropy H(XY) is given by:

$$H(XY) = -\sum_{x, y} P(x, y) \log P(x, y) \quad . \tag{A-4}$$

Using equations A-1, A-3, and A-4:

$$I(X;Y) = H(X) + H(Y) - H(XY) \quad . \tag{A-5}$$

Since H(X) is fixed, the design goal to maximize I(X;Y) is equivalent to maximizing H(Y) while minimizing H(XY). Consider H(XY) in equation A-4. When x is totally dependent on y -- that is, x = y -- H(XY) equals H(X), its minimum value. However, when x and y are independent, H(XY) equals H(X) plus H(Y), its maximum value. Therefore, H(XY) is minimized by making y as dependent upon x as possible (see reference A-1 for a more rigorous argument).

In terms of the measures developed in this paper, that means consistent and appropriate assignment of code values. Since x is not known, a qualitative assessment of this accuracy is necessary. Thus, when, on the average, y accurately represents x, H(XY) is minimized. Accordingly, I(X;Y) is maximized by maximizing H(Y) so long as Y accurately represents the messages encoded. The need for this restriction on Y becomes apparent by considering randomly assigning y to messages. This random

assignment would result in a large H(Y). But y would not really give any information about the message, x, and, consequently, the average mutual information between x and y would be zero.

Practically, all this means is that the assigned code with the greatest entropy is the best from an information level point of view. Another way to look at this is to assume each set of messages has an inherent entropy, H(X), and search for the assigned code that "captures" as much of it as possible while still accurately representing the messages.

IMPLICATIONS

Some of the implications of maximizing the coding entropy are discussed in the characteristics and design section of the main text. They are all intuitively reasonable implications; the principle of maximizing the entropy just places them in a quantitative framework. For instance, if 2 messages were assigned the same values by a code instead of unique values, the entropy of the code would be reduced from what it could be. This is reasonable since this code does not give as much information as possible. There are 2 unique messages; but knowing just the code, you would not realize this. Further discussions of these design implications are in the main text. The point is that this principle of maximizing coding entropy has practical use in designing better codes.

It has some limitations, too. Utility of the codes is not necessarily reflected in their entropy. Utility concerns the use made of the code. For example a date-time-group-originator code may be extremely useful in retrieving a message, probably better than subject or office codes. However, its entropy may be lower than subject or office codes, since the probabilities of the different values are far from equal. It is the combination of usage, accuracy, entropy, and information utility that determines the "best" code, not any one property.

APPLICATION TO INFORMATION COMPRESSION

The rationale developed here can also be applied to measuring effectiveness of information-compression techniques. For example, a Fleet Command Support Center (FCSC) in concept receives a great deal of message traffic destined for the fleet, and then summarizes it for retransmission to the fleet. If the entropy of the messages into an FCSC, $H(Y_{in})$, were compared with the entropy of the messages coming out of the FCSC $H(Y_{out})$, an indication of the effectiveness of the information-compression capability of the FCSC would be available. The entropies could easily be calculated by observing the relative frequencies of the code values of the traffic in and out. A greater $H(Y_{out})$ than $H(Y_{in})$ implies information compression and better utilization of the communications channels.

REFERENCE

A-1. Khinchin, A. I., "Mathematical Foundations of Information Theory," Dover Publications, New York 1957

APPENDIX B

FLAGWORD LIST

This appendix contains a list of the flagwords searched for in the Yom Kippur messages. The assumed explanation follows each flagword. Other interpretations are possible. Only the subject lines and reference lines of the messages were scanned for flagwords in this list; the message text was not scanned.

This list is not all-inclusive of Navy used flagwords. A sample of 600 messages from the Yom Kippur data base showed that about 10 percent contained recognizable flagwords that are not on this list. This restricted list was chosen to save time and cut computer costs.

FLAGWORD LIST

Assigned code #	Flagword	Explanation
1	AO	oiler
2	AOG	gasoline tanker
3	AOE	fast combat support ship
4	AE	ammunition ship
5	AF	store ship
6	AFS	combat store ship
7	AAW	anti-air warfare
8	ADP	automatic data processing
9	AFRTS	Armed Forces Radio & Television Sys
10	AIG	address indicator group
11	ALNAV	all Navy
12	ARFCOS	Armed Forces Courier Services
13	ASM	air-to-surface missile
14	ASW	anti-submarine warfare
15	BCT	communication data in a MoveRep
16	BOBCAT	keyword on MilSTRIPs
17	CASCOR	casualty corrected report
18	CASPER	surface ship reporting system
19	CASREP	casualty report
20	CASREPT	casualty report
21	SITREP	situation report
22	STATREP	status report
23	CFN	confirmation of # groups in a MoveRep
24	CHG	change in a MoveRep
25	CIA	Central Intelligence Agency
26	CIM	civilian information manpower
27	COD	carrier on-board delivery
28	COMFY	daily U.S. EW anal eval worldwide
29	COAT	
30	COMSEC	communications security
31	COMSPOT	special communications reports
32	COMSTAT	communications status report
33	COMSTATREPT	communications status report
34	COMSTATREP	communications status report
35	DATREP	tactical communications data report
36	DIA	Defense Intelligence Agency
37	DIG	Delivery Indicator Group
38	EAM	Emergency Action Message
39	ELINT	Electronic Intelligence

FLAGWORD LIST (Cont'd)

Assigned code #	Flagword	Explanation
40	EOB	Electronic Order of Battle
41	EW	Electronic Warfare
42	FBIS	Foreign Broadcast Information Svc
43	FFN	Fleet Flash Net
44	FORSTAT	force status
45	FOSIC	Flt Ocean Surveillance Infor Ctr
46	FOSIF	Flt Ocean Surveillance Infor Fac
47	HFDF	high frequency direction finder
48	HICOM	high command
49	HYDROPAC	Hydrographic Office Pacific
50	INTSUM	intelligence summary
51	IPIR	initial photo intelligence rpt
52	JOPREP	keyword for operational reports
53	JIFFY	
54	LOG	logistics helicopter
55	HELO	
56	LOGREQ	logistics requisition
57	MAIRS	maritime air service
58	MANREP	tactical commun management rpt
59	MERSHIP	merchant ship
60	MEREP	merchant ship report
61	MS5L	merchant ship report
62	MGDAT	msg data sys (part of Rainform)
63	MIJI	classified explanation
64	MILCON	military construction program
65	MILSTAMP	mil stand trans & movement proced
66	MILSTRIP	mil stand requisition & issue pro
67	MIRE	classified explanation
68	MOD	misc operational details
69	MOTU	mobile technical unit
70	MOVEREP	ship movement report
71	MOVREP	ship movement report
72	MRO	movement report office
73	MS3L	ship report
74	MS6L	ship report
75	MSCMR	(USNS) merchant ship cont move rpt
76	3-M	stand Navy main & mat Manage sys

FLAGWORD LIST (Cont'd)

Assigned code #	Flagword	Explanation
77	NAV	naval intelligence summary
78	INT	naval intelligence summary
79	SUM	naval intelligence summary
80	NGFS	naval gunfire support
81	NICKEL	special operations keyword
82	GRASS	special operations keyword
83	NORS	not operationally ready - supply
84	NOTAM	notice to airmen
85	OPORD	operational order
86	OPORDS	operational orders
87	OPREP-1	operational report - 1
88	OPREP-2	operational report - 2
89	OPREP-3	operational report - 3
90	OPREP-4	operational report - 4
91	OPREP-5	operational report - 5
92	OPREP	operational report
93	PINNACLE	keyword used with OPREP
94	OPSEC	operational security
95	OPSTAT	operational statistics
96	ORG	participating units in a MOVEREP
97	OTC	officer in tactical command
98	POM	Program Objective Memorandum
99	QSY	comm code concerning freq change
100	R+R	rest and relaxation
101	RPS	registered publications system
102	SAR	search and rescue
103	SHARPS	ship & helo acoustic rng pred sys
104	SKDCHG	schedule change
105	SID	standard instrument departure
106	SITSUM	situation summary
107	SONAR	sound navigation & ranging
108	SOP	standing operating procedures
109	SPECAT	special category
110	SPECOPS	special operations
111	STS	change of status in a MOVEREP
112	SUPIR	supplemental photo intell report
113	SVC	service
114	TACAMO	take chg & march off (Strat comm sys)

FLAGWORD LIST (Cont'd)

Assigned code #	Flagword	Explanation
115	TACCOM	tactical communications
116	TGO	task group Orestes
117	UNREP	underway replenishment
118	VERTREP	vertical replenishment
119	Z-GRAM	message from CNO
120	ZDK	comm code for repeated message
121	ZFK	comm code for msg doesn't concern
122	ZAT	comm code "am preparing for trans"
123	ZFW	comm code concerning channel no
124	ZFX	comm code for channel no - is open
125	RI	routing indicator
126	ZUI	comm code for your atten is invited
127	HYDROLANT	Hydrographic Office Atlantic
128	BLUE	operational identifier
129	DOT	operational identifier
130	BLUEDOT	operational identifier
131	SPECOP	special operation
132	COMBLOC	Communist Bloc
133	POSREP	position report
134	AFSCC	Air Force Sys Command Center
135	SUBNOT	submarine notice (movement)
136	ZDF	comm code for msg received at...
137	ZFF	comm code for inform me when msg rec
138	DOD	Department of Defense
139	TACSATCOM	Tactical Satellite Communications
140	TAC	Tactical Satellite Communications
141	SATCOM	Tactical Satellite Communications
142	LOGREP	logistics replenishment
143	GREENSHEET	operational identifier
144	GREEN	operational identifier
145	SHEET	operational identifier
146	NAVFORSTAT	naval force status
147	CASANOVA	keyword
148	CV	attack aircraft carrier
149	CVA	attack aircraft carrier
150	NOSIC	Naval Ocean Surveillance Info Ctr
151	GAPFILLER	Navy Communications Satellite

APPENDIX C

SUBJECT CODE

This appendix lists the subject code, SC, used to encode the Yom Kippur messages. Each category is defined by a progressively finer classification sequence so that, for example, code 211 indicates an intelligence message (2) concerning photoreconnaissance (1) requesting a mission (1). Alphabetical characters are sometimes used in the third and fourth columns; for example, code 11EJ indicates a message concerning operations (1) in the force activities, nonexercise area (1) concerning surface (E) directed action (J).

The numbers in parentheses following the codes indicate the number of times that the value occurs in the Yom Kippur data base. For example, code 1000 occurs once, code 1100 occurs 8 times, code 11A- 65 times, and code 11B- 15 times. In this listing, a further breakdown of the 65 occurrences of code 11A-, for example, into the number of times 11AA, 11AB, ... etc., occurs is not given; instead, a summary of the number of times the last digit is A, B, ... etc., is given. Since there were only 23 exercise messages, no fine breakdown of them is given; they are all treated as 1200 codes. Consequently, the fine breakdowns in the operations, force activities section are only for nonexercise messages; that is, they are all 11-- codes.

In order to learn more about the applicability of the SC, statistics on its accuracy were kept during the data reduction phase. Three people did the coding, one of whom had been in the Navy and had prior experience using the code. On the first pass through the messages 93 percent had codes assigned. No code was assigned to the remainder. A second pass through the messages was made during the proofing of the base. After this second pass 98.6 percent of the messages had been assigned codes. However, during this second pass 8.3 percent of the messages had their codes changed from the original assignment.

Care should be taken in interpreting these results. It was understood by the coders that a second pass was to be made so unless they were relatively sure of the subject matter they left the message uncoded. Since none of the encoders had any operational experience in the Navy, quite a bit of learning took place during the first coding phase. Consequently, most of the resulting changes were whole groups of messages (for example, MGDATs) that had not been previously recognized. Since a message drafter would know the subject matter of the message, this situation would not occur in an operational situation.

1. OPERATIONS (1)

1. Force Activities
   Non-Exercise (8)

2. Force Activities
   Exercise (23)*
   - (87)

   A. Air Strike (65)
   B. Air Intelligence/Surv (79)
   C. Air Transport (344)
   D. Surface Intell/Surv (48)
   E. Surface Other (57)
   F. EW (6)
   G. SAR (8)
   H. Interdiction
   I. NGFS
   J. Mine (3)
   K. Amphibious (3)
   L. Submarine (5)
   M. AAW (1)
   N. ASM (Missiles) (3)
   O. ASW (18)
   P. Ships Training (2)
   Q. Other Services (9)
   R. All Forces (28)

   - (366)

   A. SOP & SOP Modifications (1)
   B. Planning (15)
   C. Readiness/FORSTAT (74)
   D. OPORDS/Tasking (14)
   E. Schedules (33)
   F. OPREP-1 (17)
   G. OPREP-3 Pinnacle (3)
   I. Intended Action (7)
   J. Directed Action (35)
   K. SITSUM's/SITREP's (103)
   L. Completed Action (4)
   M. OPREP-3 (10)
   N. OPREP-4 (20)
   O. OPREP-5
   P. Other OPREP's (43)
   Q. Summary Reports (4)
   R. (1)

3. CASREP

   - (5)

   A. Weapons Systems (8)
   B. Sensors (11)
   C. Communications (29)
   D. Plant/Structure (54)
   E. Aircraft (3)
   F. Personnel (1)
   G. General (5)
   H. Unknown (15)

   - (14)

   A. Initial-C1 (4)
   B. Initial-C2 (25)
   C. Initial-C3 (11)
   D. Initial-C4 (4)
   E. Initial-C5
   F. STATREP's/SITREP's (39)
   G. CASCOR (33)
   H. Assistance
   K. (1)

4. Operational Support

   - (58)

   1. Towing/At Sea tender service (3)
   2. Docking Svs./Repair/LOGREQ's (43)
   3. OPSTAT's (1)
   4. Technical Support/MOTU (31)

*All operations exercise messages are counted here. No further breakdown of their occurrence is given.

5. Unit Movement – (13)
   1. Schedules & schedule changes (129)
   2. MOVEREP (126)
   3. Port Visit Notifications & Clearances (61)
   4. Fleet Locator Information (33)
   5. Underway Delays (3)
   6. MRO Queries

6. Command & Control – (16)
   1. On-scene commander designation
   2. Change in OTC (2)
   3. TF/TG Organization (22)
   4. Embarkation/Debarkation (2)
   5. (1)

7. (3)

2. INTELLIGENCE (8)

1. Photo Reconnaissance – (2)
   1. Requests for missions
   2. IPIR's (4)
   3. SUPIR's
   4. Other

2. Ocean Surveillance (Air) – (1)
   1. Spot Reports/Warning (4)
   2. Over-flights (2)

3. Ocean Surveillance (Surface) – (61)
   1. Free World MERSHIP Summaries (22)
   2. COMBLOC MERSHIP Summaries (11)
   3. MERSHIP Spot Reports (14)
   4. Enemy Warship Summaries (16)
   5. Enemy Warship Spot Reports (20)
   6. Friendly Forces Disposition (8)
   7. Transit Support (CASPER)

4. Ocean Surveillance (Subsurface) – (1)
   1. MGDAT's (630)
   2. Spot Sightings (26)
   3. Warnings (2)

5. Electronic Warfare – (34)
   1. MIJI Reports (10)
   2. COMFY COAT (Radar Reports) (10) (AFSCC is orig.)
   3. Electronic Order of Battle (EOB) (1)
   4. Warnings (1)
   5. ELINT Reports (13)

6. HFDF Spot Reports (4)

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7. FOSIC/FOSIF
   1. Warnings (9)
   2. Summaries (28)

8. General – (44)
   1. NAV INT SUMs (166)
   2. DIA (26)
   3. CIA
   4. FBIS (15)

3. ADMINISTRATION (6)

1. Personnel Matters – (52)
   1. Orders, promotions, transfers, etc. for individuals (37)
   2. Orders to officers (4)
   3. Promotion lists (1)
   4. Visit requests, notifications; itineraries; transportation, clearances, etc. (102)
   5. Requirements & allowances (2)
   6. Emergency leave (14)
   7. Family matters-no leave requested (35)
   8. Legal (8)
   9. Medical (26)

2. Public Affairs – (3)
   1. Announcements (3)
   2. Guidance (19)
   3. News Release Requests

3. Navy Affairs – (3)
   1. ALNAV's, Z-Grams
   2. Policy - other (3)
   3. Basegrams (1)
   4. Protocol (3)
   5. Conferences, Schools, briefs (5)

4. Financial – (5)
   1. Budgets/POM (10)
   2. Contracts - Procurement (4)
   3. Contracts - Construction (4) (MILCON)
   4. Other Funding (3)
   5. Personal

5. Support – (4)
   1. Publications/charts/photographs/plans/drawings (11)
   2. ARFCOS/RPS (4)
   3. Mail Services (37)
   4. ADP Support & Programs

6. Requirements & Deficiencies – (1) – (6)

A.	Personnel (14)	A.	Requests (9)
B.	Material (9)	B.	Reports (2)
C.	Support (3)	C.	Discussion (10)

7. Morale – (3)
   1. New Services (32)
   2. Bravo Zulu's Congratulatory (4)
   3. Class E. Telegrams
   4. Recreation/R&R/Religious Serv. (6)

8. Notices – (12)

A.	Safety (29)	A.	Air (14)
B.	Material & Maintenance (8)	B.	Electronics (2)
C.	Tests & (2) Evaluations	C.	Plant & Structure (9)
D.	Publications (1)	D.	Weapon Sys. (1)
		E.	Computer
		F.	General (2)

9. Reports – (21)
   1. Request for (16)
   2. Replies (2)
   3. Comments and Dis Discussion (19)
   4. Changes in

4. SUPPLY (6) — (33) — (27)

1. UNREP
   - A. AO/AOG/AOE (3) — A. Status/Load Reports (5)
   - B. AE — B. Requests for
   - C. AF/AFS (1) — C. Scheduling of (5)
   - DD. Urgent Material Request (2)

2. Parts and Material — (18)
   1. MILSTRIP Requests (202)
   2. MILSTRIP Status (140)
   3. MILSTRIP Documents (537)
   4. Delivery Schedules (34)
   5. Other Requests/Status/Documents (165)

3. Inventories — (9) — (41)
   - A. Stores (26) — A. Current Status (43)
   - B. Critical Munitions (25) — B. Required (21)
   - C. Nuclear (1) — C. Consumed
   - D. Fuel (44)

4. LOG HELO & COD — (8)
   1. Schedules/Loading Reports (34)
   2. Requests (3)

5. COMMUNICATIONS (9) — (579)

1. Services
   1. Tracers (8)
   2. Changes/Corrections/Cancellations (36)
   3. ZDK Requests to Originators (40)
   4. ZDK/ZFK Requests for Broadcast (24)
   5. Misroute/re-route actions (167)
   6. ZAT Msgs./ZDK Replies (6)
   7. ZFW, ZFX Messages
   8. Recaps

2. Crypto — (5)
   1. Keylists (3)
   2. Requests for keying material (1)
   3. Keying material status (2)

3. Routing – (21)
   1. AIG Changes (10)
   2. Standard World Wide or Area RI Lists (33)
   3. Guard Shifts (Broadcast/Terms) (19)
   4. Net entry/status (HICOM/FFN/TGO/etc.)

4. Frequency – (56)
   - A. Schedules/ Status (48)
   - B. Shifts/QSY (7)
   - C. Request for (13)
   - D. Support

   – (92)
   - A HICOM
   - B. Broadcast (26)
   - C. Terminations (7)
   - D. Link 11/14 (4)
   - E. Tactical Voice (3)
   - F. Air/Ground
   - G. Primary/ Ship/Shore
   - H. Tactical Orestes (1)
   - I. FFN

5. Reports – (56)
   1. TACCOM (7)
   2. Hazardous Condition (33)
   3. SID/Propagation Disturbances (6)
   4. Interference (5)
   5. Communications Difficulties (Trouble) (1)
   6. CIM's (1)
   7. OPSEC/COMSEC Violations (7)
   8. COMSTAT (102)
   9. Exercise (15)

6. Tests – (3)
   1. Flash Comm Checks
   2. Special Message Tests (23)
   3. Special Message Reports
   4. TACAMO Tests (3)
   5. TACAMO Test Reports (1)
   6. Special Tests/Analysis
   7. Circuit Reliability & Quality Control

6. ENVIRONMENT – (11)

1. Navigational
   1. High seas warnings (11)
   2. NOTAM's (13)
   3. HYDROPAC; notices to Mariners (16)

2. Weather – (109)
   1. General Synoptics
   2. Weather area forecasts (27)
   3. Special area forecasts (4)
   4. Severe weather/typhoon warnings (19)
   5. Ballistic wind/SHARPS forecasts (19)
   6. Other weather data

3. Special Reports – (3)
   1. High altitude readings
   2. Hydrographic forecasts
   3. Fallout and radiation forecasts (2)
   4. Radar propagation
   5. SONAR propagation (1)

7. SPECIAL MESSAGES – (3)
   1. Wirenotes (1)
   2. Personal, personal for (41)
   3. SPECAT
   4. Letters (12)

XOOO (87)

APPENDIX D

OPNAVINST 2100.1

This instruction was in effect at the time of the Yom Kippur crisis. It is included here for ease of reference.

DEPARTMENT OF THE NAVY
Office of the Chief of Naval Operations
Washington, D.C. 20350

OPNAVINST 2100.1
OP-094N/N34
Ser 658P094
30 October 1969

OPNAV INSTRUCTION 2100.1

From: Chief of Naval Operations
To: All Ships and Stations

Subj: Standard Subject Identification Codes on Navy-Marine Corps Messages

Ref: (a) SECNAVINST 5210.11A of 10 Sept 1968

1. **Purpose.** To direct and establish procedures for the assignment of a standard subject identification code to Navy-Marine Corps originated messages.

2. **Background.** With the advent of Automated Message Processing in the fleet and ashore, methods and procedures are needed to realize the full saving of personnel and time. Basic to operation of these processors are means whereby relatively simple computer programs can determine general subject matter of messages and, from this, the internal distribution to be given messages. In selecting the method discussed below, due consideration was given to requirements for simplicity, adaptability to both computer and human distribution methods, compatibility with existing and planned processors and economy of message length and human effort.

3. **Procedure**

a. The Navy-Marine Corps Standard Subject Identification Codes, reference (a), will be the standard subject identification guide.

b. All Navy-Marine Corps originated messages will contain a standard subject identification code (SSIC) except the following:

(1) Tactical messages handled exclusively on tactical circuits.

(2) Messages using code words exclusively to identify the subject matter. Exercise messages fall within this category. For example, Operation SCARLET TOWER or Exercise HIGH HEELS.

(3) Messages transmitted on dedicated or closed networks and remaining within the network. For example, Weather networks, Operational Control Center networks and Fleet Flash Nets.

(4) Proforma messages such as OPREPS, JOPREPS, MOVREPS, CASREPS and others.

(5) Messages originated by mobile units/commands, and addressed to mobile units/commands only.

c. The SSIC will consist of an appropriate five number group from reference (a) preceded by the letter "N". The letter "N" carries no other connotation than to indicate that the numeric group was taken from the Navy table. It is envisioned that future identification codes developed by other agencies will be preceded by an appropriate letter to indicate the publication or table from which the indicator was taken. Codes in reference (a) consisting of only four numbers will be preceded by a zero.

d. The SSIC will appear only in the message text and will be placed on the same line and immediately following the security classification and any special handling instructions included, e.g., LIMDIS, NOFORN, etc.

e. The SSIC will begin and end with a double slant sign. Example, UNCLAS E F T O //N02300//.

f. The SSIC //N00000// will be assigned those messages which require special or unique handling when received by the addressee. Personal messages (wirenotes, class E), service messages, and messages with passing instructions in the text fall into this category. The drafter of an emergency message may also use this SSIC if determining the proper SSIC will delay the message.

g. Each command possessing an automatic message processor will program that processor in accordance with that command's need or desires. Each command will be responsible for programming to insure proper handling of those messages requiring special or unique handling.

h. The SSIC will not be used for any purpose other than subject identification and functions dependent upon subject identification.

4. **Responsibility.** The drafter of the message is responsible for the correct assignment of the SSIC. The SSIC is a part of the text and will not be changed or modified by communication personnel.

5. **Guidance.** The authority of each command to determine internal message distribution is recognized. It must also be recognized by all

drafters of messages that internal distribution may be effected on the basis of the SSIC assigned. This will be accomplished in many cases by a machine. Therefore, common sense and good judgement should be applied in the utilization of reference (a) for determination and assignment of an SSIC.

6. Action

a. Drafters of messages will commence assigning SSIC's upon receipt of this Instruction or as soon thereafter as practicable if local implementing instructions are required. Commanders may direct the utilization of SSIC's for internal distribution on an incremental basis.

b. To aid in further study and refinement of standard subject identification procedures, CMC, CINCPACFLT, CINCLANTFLT, CINCUSNAVEUR, CHNAVMAT, and NAVCOSSACT are requested to submit comments on use of the SSIC to CNO during September 1970.

B. A. CLAREY
Vice Chief of Naval Operations

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APPENDIX E

SSIC LISTING

This appendix contains section I of SecNavInst 5210.11A. The numbers preceding the SSIC value are the number of times the value occurs in the Yom Kippur data base. Some of SSIC values found in the base are not in SecNavInst 5210.11A; those values, along with their number of occurrences, are included at the end of each major category.

SECTION I

LIST OF STANDARD SUBJECT IDENTIFICATION CODES

MILITARY PERSONNEL
1000–1999

1000–1099 GENERAL
1000 General (include Mar Corps SOP's)
1001 Reserve Policies and Programs
1010 Inspections
1020 Uniforms
1040 Career Planning
1050 Leave and Liberty
1070 Personnel Records
1080 Personnel Accounting

1100–1199 RECRUITING
1100 General
1110 Officer Candidate Recruiting
1120 Officer Recruiting
1130 Enlisted Recruiting
1133 Reenlistments and Extensions
1140 Selective Service, Conscription, and Deferment
1141 Recall

1200–1299 CLASSIFICATION AND DESIGNATION
1200 General
1210 Officer
1211 Officer Billet Classification Codes and Billet Descriptions
1212 Designator Codes
1213 Qualification Codes
1220 Enlisted
1221 Enlisted Classification Codes and Billet Descriptions
1223 Enlisted Rating and Rank Structure
1230 Testing and Interviewing
1231 Officer
1236 Enlisted

1300–1399 ASSIGNMENT AND DISTRIBUTION
1300 General
1301 Officer
1305 Enlisted
1320 Orders to Personnel
1321 Officer
1326 Enlisted
1330 Personnel Requests
1331 Officer
1336 Enlisted

1400–1499 PROMOTION AND ADVANCEMENT
1400 General
1401 Selections
1410 Requirements and Qualifications
1412 Officer Qualifications
1414 Enlisted Qualifications
1416 Officer Examinations
1418 Enlisted Examinations
1420 Promotions
1421 Temporary Promotions
1426 Permanent Promotions
1427 Rank and Precedence
1430 Advancements in Rate or Rating
1440 Changes in Rate, Rank, or Rating
1450 Reductions in Rate, Rank, or Rating

1500–1599 TRAINING AND EDUCATION
1500 General
1510 Enlisted Training
1520 Officer Training
1521 Joint and Advanced Training
1530 Officer Candidate Training
1531 Naval Academy
1532 Aviation Cadet (AvCad)
1533 Reserve Officer Training Corps (ROTC)
1534 Merchant Marine and Maritime
1540 Functional Training
1541 Fleet Training
1542 Flight Training
1543 Equipment and Systems Training
1550 Instruction Courses and Training Materials (See also 10170)
1551 Training Films, Aids, and Special Devices
1552 Training Publications
1560 Information and Education
1570 Inactive Duty Training
1571 Active Duty for Training
1580 Interservice Training

1600–1699 PERFORMANCE AND DISCIPLINE
1600 General
1601 Duties and Watches
1610 Performance and Conduct
1611 Officer
1616 Enlisted
1620 Discipline

1621 Officer
1626 Enlisted
1630 Shore Patrol and Military Police
1640 Confinement
1650 Decorations, Medals, and Awards

1700-1799 MORALE AND PERSONAL AFFAIRS
1700 General
1710 Recreation and Social Affairs
1720 Informational Services
1730 Chaplains and Religious Affairs
1740 Personal Affairs and Benefits
1741 Insurance
1742 Voting
1746 Messes and Clubs
1750 Dependents' Aid
1751 Dependents' Allowances
1752 Domestic Relations
1755 Dependents' Schooling
1760 Civil Readjustment and Veterans Affairs
1770 Casualties and Survivors' Benefits
1771 Casualties
1772 Survivors' Benefits

1800-1899 RETIREMENT
1800 General
1810 Regular Nondisability Retirement
1811 Officer
1812 Enlisted
1820 Reserve Nondisability Retirement
1821 Officer
1822 Enlisted
1830 Fleet Reserve Retirement
1850 Disability Retirement
1851 Officer
1856 Enlisted

1900-1999 SEPARATION
1900 General
1910 Enlisted
1916 Release From Active Duty, Reserve
1920 Officer
1926 Release From Active Duty, Reserve

1 1310
1 1376
1 0260

COMMUNICATIONS
2000-2999

2000-2099 GENERAL
7 2000 General (Include MarCorps SOP's)
2005 Technical Information and Modification Communications/Electronic Equipment (MarCorps only)
100 2010 Analyses and Reports
5 2020 Schedules
2 2030 Circuit Engineering
2040 Drills and Training
2050 Competitions and Inspections
2060 Aeronautical Communications
2070 Amateur Radio

2100-2199 MESSAGES
2100 General
2101 Statistical Analysis of Messages
2110 Military Messages
10 2112 Navigational Warning Messages
4 2120 Red Cross Messages
2130 Personal Messages
2140 Other Government Agency Messages
2150 Press Messages
2160 Commercial Messages

3 2200-2299 COMMUNICATION SECURITY
2200 General (See also 5500-5599)
2201 Cryptoboards
2210 Physical Security of Communication Areas
2220 Transmission Security
2221 Cryptographic Security
2230 Traffic Analysis for Security Purposes
2240 Deception
2250 Compromise of Communication Material
5 2260 Courier Services

2300-2399 COMMUNICATION METHODS, PROCEDURES, MATERIAL, AND EQUIPMENT
130 2300 General
2301 Telegraph and Radiotelegraph
2302 Radio and Radiotelephone
2303 Teletype, Teletypewriter (Teleprinter), Tape Relay
2304 Facsimile
2305 Telephone and Interphone
2306 Audible Signal Equipment
1 2307 Television
2310 Visual and Visual Light (Include infrared and ultraviolet)
2320 Direction Finding
2330 Operating Signals
2340 Abbreviations
2350 Definitions and Terminology
2360 Amphibious Communications
2370 Merchant Ship Communications
2380 Recognition and Identification (See also 3561)
3 2390 Call Signs, Address Groups
54 • 2391 Communication Routing Information

2400-2499 FREQUENCIES
8 2400 General
5 2401 Frequency Plans
5 2410 Assignments and Allocations
2420 Measurement
2430 Propagation Characteristics

10 2500-2599 NAVAL SECURITY GROUP ACTIVITIES
1 (Subject classification numbers are assigned for use by the Director, Naval Security Group)

2600-2699 PUBLICATIONS AND DEVICES
2600 General
10 2601 Registered Publications
2602 Nonregistered Publications
10 2603 Sealed Authentication Systems
2650 Cryptographic Systems
2651 Cryptographic Devices
• 2652 Installation Certifications/Waivers

2700-2799 MAIL AND POSTAL AFFAIRS
20 2700 General
2710 Policies, Regulations, and Liaison
2720 Transportation
2730 Losses, Claims, and Complaints
2 2740 Postal Operations

1 2116

OPERATIONS AND READINESS
3000-3999

3000-3099 GENERAL
153 3000 General (Include MarCorps SOP's)
11 3010 Plans (Include combined)
3020 Joint Plans
3030 Navy Plans
121 3040 Casualties and Casualty Reporting (See also 1770)
3050 Civil Defense
3060 Mobilization

3100-3299 OPERATIONS
97 3100 General
6 3110 Assignment of Aircraft and Vessels
3111 Home Ports and Yards
82 3120 Operating Procedures, Tasks, and Employment
7 3121 Operation Plans and Orders
3122 Military-Medical-Dental Guardship Assignment
32 3123 Movement Reports
78 3124 Fleet Air Operations
3125 Marine Aviation
3127 Naval Reserve Training Afloat
32 3128 Visits of Ships
2 3130 Search and Rescue
3131 Survival
10 3140 Weather Services
3141 Weather Operations and Plans
3142 Weather Maps and Charts
2 3143 Weather Codes
39 3144 Weather Observations and Reconnaisance
74 3145 Weather Forecasts, Warnings, and Advisories
3146 Climatology and Weather Records
3147 Weather Phenomena
3150 Photography
9 3160 Hydrography, Oceanography, Astronomy, Space
22 3161 Hydrography and Oceanography
3162 Astronomy
3 3163 Outer Space
2 3170 Port Operations
1 3171 Anchorage and Berthing
3172 Boarding of Ships
40 3180 Replenishment
3190 Law Enforcement

3300-3499 WARFARE TECHNIQUES
8 3300 General
6 °3301 Emergency Action (Include procedures, messages, drills, exercises)
3305 Evasion and Escape
1 3310 Aerial
3320 Air Defense
3330 Surface
4 3340 Amphibious
3350 Submarine
10 3360 Antisubmarine
3370 Mine (Sea and land)
3380 Harbor Defense
3390 Guided Missile Installation Defense
4 °3400 Nuclear, Biological, and Chemical
°3401 Nuclear,
3402 Biological
4 3403 Chemical
3410 Psychological
3420 Camouflage
3421 Dimout and Blackout
5 3430 Countermeasures
3431 Communications
3432 Controlled Devices
3433 Radar
3434 Navigational Aid
3435 Mine (Sea and land)
3436 Torpedo
1 °3440 Disaster Control
°3441 Nuclear
3442 Biological
3443 Chemical
3450 Shipping Control
3460 Captured Personnel, Material, and Documents
3461 Prisoners of War
°3462 Defectors
3470 Cold Weather
3480 Combat and Action Reports
3490 Cover and Deception

3500-3699 TRAINING AND READINESS
24 3500 General
11 °3501 Operational Capabilities
3505 Seamanship
3510 Tactical Doctrine
3520 Electronics (Other than navigational aids)
3521 Radar
3522 Sonar
3530 Navigation
3531 Aids to Navigation
3540 Engineering
3541 Damage Control
1 3560 Combat Information Center
3561 Recognition and Visual Identification (See also 2380)
2 3570 Ordnance and Gunnery
3571 Ordnance Handling and Disposal (See also 8027)
3572 Bombing
3573 Landing Party and Infantry
3574 Small Arms
3580 Countermeasures (See also 3430)
1 3590 Competitions and Awards
3591 Marksmanship
3593 Weapons
3600 Guided Missile

3700-3799 FLIGHT/AIR SPACE
28 3700 General
2 3710 General Operating Instructions
1 3720 All Weather Flying
3721 Navigational Aids
38 3722 Traffic Control
3730 Emergency Procedures
3740 Pilot Qualifications
13 3750 Flight Safety and Accident Analysis
13 3760 Flight Records and Reports
2 3770 Civil Aviation

3800-3899 INTELLIGENCE

77 3800 General
3 *3810 Intelligence Planning and Management
*3811 Estimates and Studies
8 *3820 Intelligence Collection
*3821 Human
*3822 Photographic
*3823 Electronic
*3824 Special
*3830 Intelligence Dissemination
*3831 Human
*3832 Photographic
*3833 Electronic
*3834 Special
112 *3840 Operational Intelligence
1 3850 Counterintelligence
11 *3860 Joint And Combined Intelligence
*3870 Intelligence Training
1 *3880 Intelligence Support Functions
1 *3881 Mapping, Charting and Geodesy
3 *3882 Scientific and Technical
*3883 Research and Development
*3884 Systems
*3885 Programs
*3886 Special
*3890 Intelligence Production

3900-3999 RESEARCH AND DEVELOPMENT

1 3900 General (Include basic research)
3910 Plans
3920 Programs
1 3930 Projects
3960 Tests and Evaluation

1 3021
2 3200
2 3250
1 3940
1 3023
1 3280
1 3422
1 3550
1 3817

LOGISTICS
4000-4999

19 4000-4199 GENERAL
9 4000 General
4001 Gifts to Naval Establishment
4002 Loans or Transfers to or by Naval Establishment
4010 Scrap and Salvageable Materials
4015 Equipping and Allowance Documents (Mar-Corps only)
29 4020 Petroleum
4030 Packaging, General
4031 Cleaning
4032 Preservation
4033 Packaging
4034 Packing
4035 Markings, Labels, and Designations
4040 Advanced Base Program
4050 Household Goods and Personal Property
4060 Personal Services
4061 Messes and Cafeterias
4064 Laundry
4065 Commissary Stores
4066 Exchanges
1 4067 Ships Stores Afloat
4068 Ships Stores Ashore
4069 Special Services
4080 Mobilization Reserve
4100 Conservation and Utilization of Material and Resources (Include basic materials)
4110 Integrated Material Management
4120 Standardization
4121 Specifications
4122 Standards
4123 Qualified Products Lists
*4130 Configuration Management
*4140 Cost Analysis and Review

4200-4399 PROCUREMENT
4 4200 General
4205 Procurement Authority and Responsibility
4210 Intra-Navy Procurement Assignments
4215 Coordinated Procurement (Within Department of Defense)
4 4220 Interdepartmental Procurement (Government)
4225 Local or Decentralized Procurement
3 4230 Foreign Procurement
4231 Buy American Act
342 4235 Requisitions and Other Material Requests
4250 Formal Advertising
4255 Negotiation
4260 Contract Cost Principles
4265 Pricing
4266 Government Price Controls
4270 Procurement Forms
4275 Contract Clauses
4280 Contracts, General
4281 Fixed-Price Contracts
4282 Cost-Reimbursement Contracts
4283 Other
4285 Subcontracts
4295 Dissemination of Procurement Information
*4305 Preaward Surveys
4310 Contract Clearance
4315 Bonds and Insurance
5 4330 Contract Administration
4335 Contractor Performance
7 4336 Delivery and Shipment (See also 4610)
4337 Default
4340 Government Property
1 4341 Government Furnished and Contractor Acquired Property
2 4350 Labor and Manpower
4355 Inspection and Acceptance
4360 Disputes/Strikes
4 4365 Contract Claims (See also 5890)
4366 Extraordinary Contractual Actions Facilitating National Defense
4370 Contract Termination (See also 7575)
4375 Renegotiation and Statutory Profit Limitations
4380 Small Business
4385 Fraud and Irregularities
4386 Debarred, Ineligible, or Suspended Contractors
4390 In-Lease Administration

4400-4499 SUPPLY/MATERIEL
51 4400 General
4401 Supply Ashore
4402 Shop Stores
4404 Self-Service
4406 Supply Afloat
4408 Spare and Repair Parts
4410 Cataloging, Material Identification, and Classification
4411 Maintenance Usage Data
4412 Overhaul Usage Data
25 4420 Materiel Supply Coordination
4421 Material Missions
4422 Material Cognizance Assignments
4423 Equipping/Provisioning and Allowances
4430 Material Receipt
1 4431 Material Shortages
2 4440 Inventory Control
4441 Allowances
4442 Supply Levels
4443 Financial Inventory Control
4450 Storage
4451 Standards and Procedures
4452 Space Control
4453 Operations
4454 Inspection and Maintenance
4460 Materials Handling
4470 Distribution
4480 Material Expenditure
7 4490 Material Requirements, Advance Planning

4500-4599 REDISTRIBUTION AND DISPOSAL OF PROPERTY
4500 General
4510 Special Restrictions on Disposal Actions
4520 Donations and Transfers
4525 Abandonment or Destruction
4530 Sales
4535 Out-Leases and Easements

4540 Exchange or Sale of Nonexcess Personal Property
4550 Inventories
4551 Contractor Inventory
4552 Termination Inventory
4555 Special Classes of Property
4560 Special Bureau Instructions
4565 Foreign Areas
4570 Excess and Surplus Property

4600-4699 TRAVEL AND TRANSPORTATION

13 4600 General
21 4610 Shipments (Cargo and freight)
4611 Bills of Lading
4612 Shipment Orders
4613 Consignment Instructions
4614 Priority Indicators and Deadline Delivery Dates
2 4615 Routing
4616 Demurrage
6 4620 Sea Transportation
4621 Government-Owned Ships
4622 Merchant Marine (Commercial ocean carriers)
41 4630 Air Transportation
3 4631 Government-Owned Aircraft
4632 Commerical Air Carriers
4640 Land Transportation
4641 Government-Owned Equipment
4642 Rail Carriers
4643 Motor Carriers
62 4650 Passenger Transportation/Travel
4651 Regulations
4660 Terminal Operations

4700-4799 MAINTENANCE, CONSTRUCTION, AND CONVERSION

6 4700 General
4701 Scheduling
11 4710 Overhaul/Rework
4711 Availability, Restricted
4712 Availability, Tender
*4713 Availability, Technical
1 4720 Alterations and Improvements
4 4730 Inspections, Examinations, Tests, and Surveys
4740 Salvage and Towing
4750 Upkeep
4760 Construction and Conversion
1 4770 Reserve Fleets and Inactive Ships or Aircraft
4780 Service Craft and Relics
4 *4790 Maintenance and Material Management

4800-4899 CURRENT PRODUCTION AND INDUSTRIAL MOBILIZATION PLANNING

4800 General
4801 Production Policy
4802 Industrial Readiness
4803 Industrial Manpower
4804 Plant Performance and Awards
1 4810 Requirements
4811 Current Requirements
4812 Mobilization/Emergency Requirements
4813 Bills of Material
4814 Material and Product Classification
2 4830 Priorities and Controls
4831 Preference Ratings
4832 Controlled Materials Allocation
4833 Allocations Other Than Controlled Materials
4840 Materials
4841 Stockpiling
4850 Production Progressing, Expediting, and Scheduling
4851 Production Planning and Scheduling
4852 Production Expediting
4853 Production Analysis
4854 Production Control
*4855 Quality Assurance/Control
4856 Maintenance Management Engineering
4857 Military Urgencies System
4858 Value Engineering
4860 Supply Sources/Facilities
4861 Navy and Marine Corps Manufacturing Facilities
4862 Industrial and Industrial Reserve Facilities
4870 Machine Tools and Industrial Production Equipment
4871 Reserve Production Equipment
4880 Expansion of Private Industry

4900-4999 FOREIGN MILITARY ASSISTANCE AND MUTUAL SECURITY PROGRAMS

1 4900 General
1 4910 Grant Aid
4920 Reimbursable Aid/Mutual Security and Military Sales
4940 Packing, Handling, Transportation, and Storage
1 4950 Training
4951 Training Courses (Quotas, duration)
4952 Orders to Foreign Trainees

1 4629
2 4926
1 4025
1 4180
2 4731

GENERAL ADMINISTRATION AND MANAGEMENT
5000–5999

5000–5199 GENERAL
1 5000 General (Include MarCorps SOP's)
5030 Names and Symbols
5040 Management Inspections and Surveys
5041 Administrative Inspections
5042 On-Site Surveys
10 5050 Meetings, Conferences, Conventions, and Visits
5060 Honors and Ceremonies
5061 Public Service Awards
5070 Libraries and Library Services
5080 Civil Affairs, Military Government
3 5100 Safety
5101 Accident Prevention
5120 United States Savings Bonds

5200–5299 MANAGEMENT PROGRAMS AND TECHNIQUES
5200 General
*5210 RECORDS/PAPERWORK MGMT.; OFFICE METHODS
5211 Files and Records Systems
*5212 Records Disposal Systems (Include transfer and destruction)
*5213 Forms Management
*5214 Reports Management
5215 Issuance Systems
5216 Correspondence Management
*5217 Effective Writing (Include drafting and review)
*5218 Mail Management (Exclude postal affairs)
*5220 Workload/Performance Measurement
2 5230 Mechanized and Automatic Data Processing Systems
5240 Industrial Methods
5250 Management Sciences/Operating Research
*5260 Information Systems

5300–5399 MANPOWER/PERSONNEL (USE FOR OVERALL CIVILIAN AND MILITARY PERSONNEL MATTERS)
5300 General
*5305 Incentive Awards (Military/Civilian)
1 5310 Manpower
5311 Requirements
5312 Utilization
5314 Statistics
5320 Complements, Allowances, Billets, Allocations, and Ceilings
5321 Complements and Allowances
5322 Ceiling Allocation and Control
5330 Hours of Work/Daily Routine
5340 Contributions, Solicitations, and Collections
3 5350 Minority Races
5360 Deaths and Funerals
5370 Standard of Conduct
5371 Relating to Procurement
5380 Services
5381 Banking Facilities and Credit Unions
5390 Leadership

5400–5499 ORGANIZATION, FUNCTIONS, AND STATUS
5400 General
5401 Organization Concepts and Principles
5402 Delegation/Succession of Authority
5410 Department of Defense and Interservice
*5420 Boards, Committees, Councils, and Groups
5430 Navy Department (Seat of Government)
5440 Operating Forces
5441 Status of Vessels
6 5442 Status of Aircraft
5450 Shore Establishment
5451 Aviation Shore Establishment
5452 Air Training Commands
5460 Department of the Navy

5500–5599 SECURITY (See also 2200–2299)
5500 General
6 5510 Security Regulations
5511 Classified Material Control
1 5512 Identification (Credentials, tags, passes, and permits
1 5520 Investigations
2 5521 Name Checks and Personnel Clearances
5522 Inspections
5530 Censorship
5535 Censorship, Telecommunication
5540 Industrial Security
1 5541 Facilities
5542 Personnel
5550 Commerce and Travel
5560 Traffic Control and Parking
5570 Safeguarding Unclassified Matter

5600–5699 PUBLICATIONS, PRINTING, DUPLICATING, AND REPRODUCTION
2 5600 General
5602 Preparation
5603 Production
5604 Procurement
5605 Distribution

5700–5799 EXTERNAL RELATIONS
2 5700 General
5710 International Relations
5711 Standardization Programs and Agreements
5713 Naval Missions
8 5720 Public Relations
5721 Speeches
5722 Exhibits
1 5723 Guest Cruise Program
5724 Fleet Home Town News
5725 Reserve Program
1 5726 Community Relations
5727 Press Relations
1 5728 Audio and Visual (Motion and still pictures, radio and television)
5730 Congressional and Legislative Liaison
5740 Executive Agencies, Relations With
5741 General Accounting Office
5750 Historical Matters
*5760 Organizations, Associations, Societies, Individuals, and Commercial Enterprises

8

5800-5899 LAWS AND LEGAL MATTERS
5 5800 General
5801 Legal Assistance
5802 Immigration
5810 Military Justice
5811 Pre-Trial Matters
5812 Commanding Officers Non-Judicial Punishment
1 5813 Courts-Martial Trials
5814 Courts-Martial Reviews and Appeals
5815 Sentences
5817 Personnel of Courts
1 5820 Jurisdiction, Military and/or Civil
5821 Delivery of Personnel to Civil Authorities
5822 Civil Courts
5830 Courts of Inquiry and Investigations
5840 Taxes, Customs, and Duties
5850 Codification and Citations
5860 Legislation and Congressional Action
5861 Legislative Proposals
5862 Legislative Enactments
5863 Congressional Investigations
5870 Patents, Copyrights, Inventions, Trademarks
5890 Admiralty
5895 Claims (Other than contract claims)

5900-5999 OFFICE SERVICES
5900 General
5910 Space (Requirements/allocations)
5920 Maintenance
5930 Stenographic, Clerical, and Messenger

1 5610
1 5235
1 5601

9

MEDICINE AND DENTISTRY
6000–6999

6000–6099 GENERAL
1 6000 General (include MarCorps SOP's)
6010 Administration

6100–6199 PHYSICAL FITNESS
6100 General
6110 Physical Standards
6120 Physical Examinations
2 6150 Health and Medical Records

6200–6299 PREVENTIVE MEDICINE
6200 General
6210 Quarantine
1 6220 Communicable Diseases
6222 Venereal Disease
6224 Tuberculosis
6230 Prophylaxis
6240 Hygiene and Sanitation
6250 Insect, Pest, and Rodent Control
6260 Industrial Health
6270 Toxicology

6300–6399 GENERAL MEDICINE
1 6300 General
6310 Diseases and Injuries
4 6320 Treatment and Hospitalization
6321 Beds
6322 Supernumeraries
6330 Rehabilitation and Convalescence

6400–6599 SPECIAL FIELDS
6400 General
6401 Medical Specialties
6410 Aviation Medicine
6420 Submarine and Diving Medicine
6430 Tropical Medicine
1 6440 Amphibious and Field Medicine
6450 Dispensary Medicine
6460 Surgery
6470 Radiological Medicine
6480 Special Weapons, Medical Problems Concerning
6490 Vision
6500 Research
6510 Pathology
6520 Psychiatry
6530 Blood and Derivatives
6540 Space Medicine
6550 Nursing

6600–6699 DENTISTRY
6600 General
6610 Professional Service
6620 Treatment
6630 Prosthetic Dentistry
2 6640 Oral Surgery
6650 Operative Dentistry
6660 Periodontia
6670 Dental Specialties

6700–6899 EQUIPMENT AND SUPPLIES
6700 General
2 6710 Drugs, Chemicals, and Biologicals
6720 Surgical Dressings
6730 Surgical and Diagnostic
6740 Laboratory and Pharmacy
6750 Dental
6760 X-Ray
6770 Hospital
6780 Field (Medical kits and assemblies)
6790 Occupational Therapy
6800 Orthopedic
6810 Optical
6820 Textbooks and Journals

FINANCIAL MANAGEMENT
7000–7999

7000–7099 GENERAL
7000 General
7010 Nonappropriated Funds
7020 Cross/Common Servicing (DOD)
7030 Work for Other Agencies
7040 Specific Appropriations/Funding Responsibilities
7041 Military Personnel
7042 Operations and Maintenance
7043 Procurement
7044 Research, Development, Test and Evaluation
7045 Military Construction
7050 Host-Tenant Relationships (Intra-Navy)

7100–7199 BUDGETING
7100 General
7101 Appropriation Structure and Language
7102 Exhibits and Format
7110 Budget/Estimates Preparation
7111 Regular Appropriations
7112 Industrial/Management Funds
7113 Stock Funds
7114 Supplemental and Deficiency Appropriations
7120 Budget Review
7121 Hearings
7122 Mark-Ups and Reclamas
7130 Budget Execution
7131 Apportionments/Allocations
7132 Financial Plans and Operating Budgets
7133 Reprogramming

7200–7299 DISBURSING
7200 General
7210 Procurement, Custody, and Disposition of Funds
7220 Military Pay
7230 Civilian Pay
7240 Public Vouchers
7250 Disbursing Records, Reports, and Returns
7251 Site-Audited Returns
7270 Receipts
7280 Regional Consolidation Procedures

7300–7399 APPROPRIATION, FUND, COST, AND PROPERTY ACCOUNTING
7300 General
7301 Appropriation Accounting
7302 Fund Accounting
7303 Allotments and Projects Orders
7310 Cost Accounting
7312 Cost Classifications
7320 Property Accounting
7321 Plant Property Accounting
7322 Minor Property in Use
7323 Stores Accounts
7330 Accounting Reports and Returns
7331 Industrial Accounting Reports and Returns

7400–7499 PAY ADMINISTRATION AND PAYROLL AND LABOR ACCOUNTING
7400 General
7401 Tax Withholding
7410 Civilian Labor Accounting
7420 Civilian Payroll Accounting
7421 Pay Authorizations and Controls
7430 Military Payroll Accounting
7431 Allowances and Accounts

7500–7599 AUDITING
7500 General

7510–7599 INTERNAL AUDITING
7510 General
7511 Audit Schedules
7520 Internal Audit Procedures
7540 Internal Audit Reports
7541 Periodic
7542 Continuous
7543 Disbursing
7544 Housing
7545 Property
7546 Special
7547 Coordinated

7560–7599 CONTRACT AUDITING
7560 General
7561 Contractors' Controls and Procedures
7562 Accounting Rulings, Precedents, and Decisions
7564 Audit Liaison
7565 Coordinated Audit Program
7566 Audit Services for Other Than DOD
7570 Contract Audit Procedures
7571 Cost-Type Contracts
7572 Fixed-Price Contracts
7573 Subcontracts
7574 Pricing Surveys
7575 Termination Claims
7576 Escalation Claims
7577 Appeal and Review Briefs
7580 Contract Audit Reports
7581 Preaward Survey
7582 Advisory Accounting Reports
7583 Negotiated Final Overhead Reports
7584 Contract Audit Closing Statements
7585 General Accounting Office Reports
7590 Contract Audit Cost Principles
7591 Amortization and Depreciation
7592 Research and Development Expenses
7593 Retirement and Profit-Sharing Plans
7594 Premium Pay
7595 State and Local Taxes
7596 Rental Expenses

7600–7699 INDUSTRIAL FUND FINANCING
7600 General
7610 Charters
7620 Cash Allocations
7630 Financial Condition
7640 Income and Expense
7650 Accounting Handbook

7670 Working Capital Fund Regulations

7700-7799 PROGRESS AND STATISTICAL REPORTING
7700 General
7710 Policies
7720 Procedures

7800-7899 CONTRACT AND SPECIAL FINANCING
7800 General
7810 Contract Financing
7820 Special Financing

4 7221
1 7721

ORDNANCE MATERIAL
8000–8999

8000–8199 GENERAL ORDNANCE MATERIAL, AMMUNITION AND EXPLOSIVES

11 8000 Ordnance Material, General
8005 Technical Information and Modifications (MarCorps only)
1 8010 Ammunition and Explosives, General
8011 Allowances
9 8012 Distribution and Issue
8013 Fleet Return Ammunition
8014 Maintenance and Rework/Renovation
16 8015 Ammunition Stock Recording Systems
8020 Ammunition and Explosives Safety
8021 Packaging and Carloading
8022 Cargo Ship Loading
8023 Handling, Stowage, and Transportation
1 8024 Restrictions and Suspensions
8025 Casualties and Malfunctions
8026 Disposition of Ammunition
8027 Explosive Ordnance Disposal (See also 3571)
8030 Gun Ammunition
8031 20-mm and 40-mm
8032 3 Inch
8033 5 Inch
8034 6 Inch and larger
8035 Saluting Gun Ammunition
8036 Line-Throwing Gun Ammunition
8037 Aircraft Gun Ammunition
8040 Rockets
8041 Surface
8042 Aircraft
8043 Ground
1 8050 Pyrotechnics
8051 Surface
2 8052 Air
8053 Subsurface
8054 Ground
8060 Demolition Material
8061 Amphibious and Underwater
8070 Atomic, Biological, and Chemical Warfare Material
8071 Atomic Warfare Material
8072 Biological Warfare Material
8073 Chemical Warfare Material
8090 Land Type and Marine Corps Ammunition
8091 Small Arms Ammunition
8092 Land Mines
8093 Grenades
8094 Artillery
8095 Mortar
4 8110 Special Weapons
8130 Drill and Training Ammunition (All types)
8150 Bombs
8190 Miscellaneous Ammunition and Explosives Material
8191 JATOS

8200–8299 FIRE CONTROL AND OPTICS

8200 General
8210 Optics
8220 Gun Fire Control
8221 Systems
8222 Radar
8223 Directors
8224 Computers and Rangekeepers
8225 Battery Alignment
8226 Ballistics
8227 Gun Sights
8230 Target Designation Systems
8240 Airborne Fire Control
8241 Systems
8242 Radar
8243 Gun Sights
8244 Computers
8245 Bombsights and Bomb Directors
8250 Rocket Fire Control
8260 Guided Missile Fire Control
8261 Systems
8262 Radar
8263 Directors
8264 Computers
8270 Stable Elements
8280 Underwater Fire Control
8281 Surface Ship
8282 Submarine

8300–8399 GUNS AND MOUNTS

8300 General
8310 3 Inch
8311 3"/50 Caliber
8312 3"/70 Caliber
8320 5 Inch
8321 5"/25 Caliber
8322 5"/38 Caliber
8323 5"/54 Caliber
8330 6 Inch and Larger
8331 6"/47 Caliber
8332 8"/55 Caliber
8333 12"/50 Caliber
8334 14"/50 Caliber
8335 16"/45 and 16"/50 Caliber
8350 Line-Throwing Guns
8360 Machine Guns (Surface)
8361 30 Caliber and 50 Caliber
8362 20-mm
8363 40-mm
3 8370 Small Arms and Landing Force Equipment
8373 Special Rifle Team Equipment
8380 Airborne Guns, Launchers, and Racks
8381 Guns
8382 Bomb Racks
8383 Rocket Racks and Launchers
8390 Missile Launchers and Projectors
8391 Projectors and Launchers (A/S)
8392 Depth Charge Release Tracks
8393 Rocket Launchers
8394 Guided Missile Launchers
8395 Torpedo Tubes
8396 Torpedo Launching Racks

8400–8499 COMBAT VEHICLES

8400 General
8410 Landing Vehicles, Tracked (LVT)
8411 Personnel and Cargo Carriers

8412 AAA Weapons and Cargo Carriers
8413 Engineer Vehicles
8414 Howitzer Carriages
8415 Recovery Vehicles
8416 Utility Vehicles
8420 Tanks and Self-Propelled Artillery
8421 Gun Tank (90mm and smaller)
8422 Gun Tank (Larger than 90mm)
8423 Flamethrower Tanks
8424 Recovery Vehicle
8425 Self-Propelled Artillery (155 mm gun and larger)
8426 Self-Propelled Artillery (Smaller than 155mm gun) and Tractor
8430 Wheeled and Half-Tracked Vehicles
8440 Amphibious Vehicles

8500-8599 UNDERWATER ORDNANCE
1 8500 General
5 8510 Torpedoes
8512 Aircraft Launched
8513 Submarine Launched
8514 Surface Launched
8530 Depth Charges
8535 Depth Bombs
8540 Projector Charges and Rockets
2 8550 Mines
8551 Aircraft Laid
8553 Submarine Laid
8554 Surface Laid
1 8560 Harbor Defense Equipment (Include nets, booms, controlled mines, and associated acoustic systems)
8570 Underwater Countermeasures and Evasion Devices
8571 Ordnance Locators

8600-8799 AVIATION ORDNANCE
1 8600 General

8800-8899 GUIDED MISSILE WEAPONS
2 8800 General
8805 Technical Information and Modifications (MarCorps only)
8810 Intercept-Aerial (AIM, CIM, LIM, MIM, RIM)
8820 Surface Attack (AGM, CGM, HGM, LGM, MGM, PGM, RGM, UGM)
8830 Underwater Attack (UUM)
8840 Drones (AQM, MQM, BQM)
8850 Training (ATM, MTM)

8900-8999 MISCELLANEOUS ORDNANCE MATERIAL
8900 General
8950 Deperming and Degaussing
8960 Armor

3 8124

SHIPS DESIGN AND MATERIAL
9000–9999

1	9000	General (Include MarCorps SOP's)
	9010	Ships Characteristics
3	9020	Design of Vessel
	9030	Ship Readiness
	9040	Service to Ships (Include cribbing, scaffolding, and staging)
	9050	Laying Out
	9060	Launching
	9070	Docking for Navy
1	9080	Trials
•	9090	Fabrication Processes
	9110	Hull Structure
	9120	Hull Fittings
	9130	Armor Protection
	9140	Deck Coverings
	9150	Aircraft Fuel Cargo Stowage and Equipment
	9160	Access Openings
	9170	Masts, Booms, and Spars
	9180	Rigging, Sails, and Awnings
	9190	Protective and Preservative Coatings
	9200	Winches, Capstans, Cranes, and Derricks
	9210	Hydraulic Speed Machinery
	9220	Steering Machinery
	9230	Industrial Gases and Gas Producing Equipment and Stowage
	9240	Ship Control
	9250	Towing and Towing Equipment
	9260	Mooring and Mooring Equipment
	9280	Nomenclature and Marking
	9290	Seaworthiness
	9300	Storerooms and Miscellaneous Stowage
	9310	Repair Parts (See also 4408)
	9320	Office Spaces
2	9330	Living and Berthing Spaces
	9340	Commissary Spaces
	9350	Laundry Spaces
	9360	Sanitation Spaces
	9370	Medical and Dental Spaces
	9380	Ventilating, Heating, and Air Conditioning
	9390	Insulation and Lagging
	9400	Machinery Plant and Systems
1	9410	Main Propelling Machinery
	9420	Reduction Gears (Main Propelling Machinery)
	9430	Shafting and Bearings
	9440	Propellers
	9450	Lubrication Systems
	9460	Condensers and Air Ejectors
1	9470	Pumps
1	9480	Piping Systems
	9490	Compressed Air Plant
	9500	Auxiliary Machinery
2	9510	Steam Generating Equipment (Boilers)
	9520	Uptakes and Smokepipes
	9530	Blowers, Forced Draft
	9550	Ship Fuel Handling, Stowage, and Equipment
	9560	Boiler Feed-Water Equipment
1	9580	Distilling Plants
	9590	Refrigerating Plants
	9600	Electric Plants
	9610	Electric Power Generation
	9620	Electric Power Distribution
	9630	Electric Power Application
	9640	Lighting Systems
	9650	Interior Communications Systems and Apparatus
	9660	Ships Searchlights
5	9670	Electronics
	9671	Radio
1	9672	Radar
	9673	Radiac
	9674	Sonar
	9690	Test Instruments, Electrical and Electronics
	9700	Signaling Apparatus
	9710	Fire Control Installation
	9720	Turrets
	9730	Armament of Ships
	9740	Antiaircraft and Dual Purpose Gun Mounts
	9750	Torpedo Handling and Stowage
	9760	Stowage of Depth Charges, Wrecking Charges, and Mines
	9770	Atomic, Biological, and Chemical Defense Equipment
	9780	Ammunition, Bomb, and Rocket Handling and Stowage
	9784	Fleet Ballistic Missile Equipment
	9790	Small Arms and Landing Force Equipment Handling and Stowage
	9810	Mine, Torpedo, and Bomb Protection
	9820	Small Boats
	9830	Aircraft Handling and Stowage
	9850	Motion Picture Projection
	9860	Training Apparatus
	9870	Indicating and Recording Instruments
2	9880	Damage Control
	9890	Nuclear Reactors
	9900	Nuclear Protection (Shielding and radiological safety)
	9910	Workshop Equipment
	9920	Tools and Equipment, Portable
	9930	Fire Fighting Equipment
	9940	Ship Salvage, Marine Rescue and Related Equipment
	9960	Tract and Suspension Systems
	9970	Heat Transfer Equipment, General

1 9412

1 9764

GENERAL MATERIAL
10000–10999

10000–10099 GENERAL
10000 General (include MarCorps SOP's)
10010 Technical Information and Modification (MarCorps only)

10100–10199 PERSONNEL MATERIAL
10100 General
10110 Provisions and Rations
10120 Clothing and Uniforms
10121 Clothing and Small Stores
10122 Naval and Marine Corps Reserve Clothing
10123 Officer Clothing and Uniforms
10124 Officer Candidate Clothing and Uniforms
10125 Organizational Clothing
10126 Special Clothing/Cold Weather Clothing
10127 Flight Clothing
10128 Atomic, Biological, and Chemical Warfare Protective Clothing
10130 Ships Store Items
10140 Exchange Items
10150 Personal Service Equipment
10151 Mess
10152 Laundry
10160 Furniture and Furnishings (Nonoffice)
10170 Instruction and Training Equipment
10171 Training Aids and Devices

10200–10299 MACHINERY AND TOOLS
10200 General
10210 Agricultural Machinery
10220 Air Compressors and Pumps
10230 Air Conditioning and Ventilating Equipment (See also 9380, 11380)
10250 Conveying and Hoisting Equipment
10260 Electric Motors and Generators
10270 Engines (Except ships and aircraft)
10290 Tools

10300–10599 MISCELLANEOUS
10300 General
10301 Abrasives
10310 Metals
10311 Steel
10320 Nonmetallic Materials
10321 Wood, Lumber, and Allied Products
10322 Concrete
10323 Rubber
10330 Chemicals and Gases (Except Warfare)
10331 Helium
10332 Oxygen
10340 Fuel
10341 Gasoline and Jet
10342 Propellants and Oxidizers
10343 Fuel Oils
10345 Fueling and Fuel Storage Equipment
10350 Lubricants
10360 Protective and Preservative Coatings and Compounds
10365 Paints, Dopes, and Related Products
10370 Building Materials
10380 Electrical and Electronic Components
10390 Electric Distribution Equipment
10400 Molds, Dies, Jigs
10410 Hardware
10420 Bearings
10430 Plumbing Fixtures and Piping
10440 Hose, Gaskets, Packing
10450 Cordage and Wire Rope
10460 Office Equipment and Supplies
10461 Electric/Mechanical Punched Card Equipment
10462 Electronic Computers and Electronic Data Processing Machines
10470 Safety and Survival Equipment and Devices
10480 Sanitary and Cleaning Equipment
10490 Materials Handling Equipment
10500 Navigational and Mooring Aids
10510 Instruments
10520 Flags and Pennants
10550 Electronics (See also 9670)
10551 Radar
10552 Sonar
10553 Loran, Racon
10560 Diving Equipment
10570 Animals, Domestic and Wild
*10580 Container(s) (As used in containerization)

10700–10799 PHOTOGRAPHIC EQUIPMENT AND ACCESSORIES

10700 General
10710 Picture Taking Equipment and Accessories (Include cameras, camera supplies, accessories, attachments, and components)
10711 Reconnaissance
10712 Strike Recording
10713 Mapping and Charting
10714 Scope Recording
10715 Still Picture (Not otherwise listed)
10716 Motion Picture (Not otherwise listed)
10717 Special Purpose (Include instrumentation)
10718 Set or System
10720 Picture Processing Equipment (Include supplies, accessories, attachments, and components)
10721 Processing Machine
10722 Developers
10723 Washers
10724 Driers
10725 Printers
10730 Picture Using Equipment (Include supplies, accessories, attachments, and components)
10731 Still Projectors
10732 Motion Picture Projectors
10733 Viewing Devices
10734 Set or System
10740 Photographic Intelligence Equipment and Accessories

FACILITIES AND ACTIVITIES ASHORE
11000–11999

11000–11099 GENERAL
11000 General (include MarCorps SOP's)
11010 Shore Station Development and Maintenance
11011 Real Estate Property
11012 Design Criteria
11013 Shore Station Construction
11014 Shore Station Maintenance
11015 Agriculture and Conservation
11016 Plant Property
11017 Grounds or Unpaved Areas (Land)
11018 Testing Areas and Facilities
11019 Shore Station Special Projects
11080 Atomic, Biological, and Chemical Defense
11090 Damage Control

11100–11199 STRUCTURES AND FACILITIES
11100 General
11101 Housing
11102 Training
11103 Mess
11104 Housekeeping
11105 Welfare
11106 Recreational
11107 Resale Activities
11108 Religious Structures
11110 Medical and Dental
11112 Hospital
11114 Dispensary
11116 Dental Clinic
11120 Communications
11130 Aviation
11131 Hangars
11132 Runways
11133 Lighting
11135 Crash, Salvage, and Rescue
11137 Service and Repair
11140 Ordnance
11143 Guided Missile Assembly and Test
11150 Research and Development Facilities
11151 Harbor Defense
11152 Drill and Parade Grounds
11153 Mooring and Navigation
11154 Observatories
11160 Storage
11161 Storehouses
11162 Fuel Storage Facilities
11163 Magazines
11170 Cemeteries

11200–11299 TRANSPORTATION FACILITIES, HEAVY EQUIPMENT
11200 General
11210 Highways and Roads
11220 Bridges, Trestles, Overpasses
11230 Railways and Rolling Stock
11240 Automotive
11245 Technical Information and Modifications (MarCorps only)
11250 Boat or Water Transportation
11260 Heavy Equipment
11261 Construction-Type
11262 Heavy Weight Lifting
11270 Engineer Supplies and Construction Equipment
11275 Technical Information and Modifications, Engineer Supplies and Construction Material (MarCorps only)

11300–11399 UTILITIES AND SERVICES
11300 General
11310 Power
11320 Fire Protection and Fire Fighting
11330 Water Supply
11340 Drainage
11345 Sewers and Sewerage
11350 Refuse Collection and Disposal
11360 Lighting
11370 Heating
11380 Refrigeration and Air Conditioning (See also 10230)

11400–11499 FLEET FACILITIES
11400 General
11410 Waterfront
11420 Drydocks
11430 Marine Railways
11440 Shipways
11450 Weight Handling
11460 Dredging
11470 Pontoons

1 11214
1 11244

CIVILIAN PERSONNEL
12000–12999

12000–12099 GENERAL

12100–12199 CIVIL SERVICE COMMISSION
12150 Boards of Civil Service Examiners

12200–12299 PERSONNEL PROVISIONS, GENERAL
12210 Personnel Concepts and Definitions
12211 Veteran Preference
12213 Overseas Personnel
12250 Organization for Personnel Management
12270 Personnel Controls and Direction
12273 Inspections, Surveys, and Audits
12280 Personnel Statistics
12290 Personnel Records and Processing
12293 Personnel Records
12296 Processing Personnel Actions

12300–12399 EMPLOYMENT
12300 Employment (General)
12303 Military Service
12304 Dual Employment and Dual Compensation
12305 Competitive Service, Status, and Conversion
12306 Personal Service Contracts
12310 Appointments/ Accessions
12311 Appointments
12314 Transfers
12315 Reinstatement
12316 Reemployment
12317 Restoration
12330 Recruitment and Selection
12331 Recruitment, Departmental
12332 Recruitment, Field
12334 Qualifications (Standards and evaluation methods)
12340 Promotions, Reassignments, and Details
12350 Job Retention and Separation
12351 Reduction in Force and Grade
12352 Separations

12400–12499 EMPLOYEE DEVELOPMENT, PERFORMANCE AND UTILIZATION
12410 Employee Training/Development
12430 Performance Appraisals and Ratings
12431 Performance Ratings
12450 Employee Recognition and Incentives
12451 Incentive Awards
12452 Suggestion System
12453 Length of Service Awards
12454 Non-Navy Awards
12460 Employee Utilization

12500–12599 CLASSIFICATION, PAY, AND ALLOWANCES
12510 Position Classification
12511 Classification, Departmental
12512 Classification, Field
12530 Pay Systems (Specific)
12531 Prevailing Wage Rate Systems (Wage fixing and ungraded ratings)
12550 Pay Administration (General)
12552 Wage and Salary Changes
12553 Allotment of Pay
12590 Allowances and Differentials
12591 Overseas Differentials and Allowances
12593 Subsistence and Quarters
12594 Uniforms and Uniform Allowances

12600–12699 ATTENDANCE AND LEAVE
12610 Hours of Work (See also 5330)
12630 Absence and Leave

12700–12799 EMPLOYEE RELATIONS AND SERVICES
12710 Employee relations (General)
12713 Nondiscrimination/Employment Policy Program
12720 Labor Relations
12721 Employee Organizations
12730 Employee Responsibility and Conduct (See also 5370)
12732 Employee Security Program (See also 5500)
12733 Political Activity
12750 Discipline
12770 Grievances and Appeals
12771 Grievance Appeals
12772 Discrimination Appeals
12790 Services to Employees (See also 5380)
12792 Health Programs

12800–12899 INSURANCE AND ANNUITIES
12810 Injury Compensation
12830 Retirement
12850 Unemployment Compensation
12870 Insurance
12871 Group Life Insurance
12872 Group Health Insurance

12900–12999 SPECIAL PERSONNEL MATTERS
12910 Emergency Programs (See also 3050)
12911 National Defense Executive Reserve
12930 Specific Positions or Examination Programs
12931 Legal Positions
12932 Super Grade Positions
*12950 Career Management

AERONAUTICAL AND ASTRONAUTICAL MATERIAL
13000–13999

13000–13099 GENERAL
13000 General
13010 Weapons Systems
13050 Configuration Control
1 13051 Engineering Change Proposals
13052 Changes and Bulletins
13053 Change Kits
13060 Weight and Balance
2 13070 Material Reliability
13080 Exterior/Interior Finish, Marking, and Lighting
13090 Logs and Records

13100–13199 AIRCRAFT (Complete)
13100 General (Use for more than one class of aircraft and for both aircraft and guided missiles. Use 8800 for complete guided missiles.
13110 Fixed Wing
1 13120 Rotary Wing
13130 Lighter-Than-Air
13140 Gliders
13150 Aircraft Targets

13300–13399 ASTRONAUTIC VEHICLES (Complete)
13300 General

13400–13599 SYSTEMS, COMPONENTS, AND ACCESSORIES
13400 General
1 13410 Structural Components
5 13420 Landing Gear, Wheel, and Brake Systems and Components
13430 Arresting and Launching, Provisions for
13440 Hydraulic and Vacuum Systems and Components
13450 De-Icing, Anti-Icing, and Anti-Fogging Systems and Components
13460 Air Conditioning, Heating, Pressurizing Equipment and Systems, and Specially-Designed Components of Oxygen Breathing
1 13470 Auxiliary Fuel Tanks
13480 Parachutes and Aerial Pickup, Delivery, and Cargo Tie-Down Equipment
13490 Tires and Tubes
13510 Recovery Gear
13520 Guidance Equipment
13530 Remote Control Systems and Components
13540 Nuclear Reactors
13550 Nuclear Shielding
13570 Airship Material
1 13590 Miscellaneous Accessories and Components

13700–13799 ENGINES AND ENGINE SYSTEMS (INCLUDING COMPONENTS AND ACCESSORIES)
1 13700 General
13710 Reciprocating
2 13720 Turboshaft and Jet
13730 Rocket
13740 Nuclear
13760 Engine Fuel Systems
13770 Engine Electrical Systems
13780 Engine Cooling Systems
1 13790 Miscellaneous

13800–13899 LAUNCHING, LANDING, AND GROUND SUPPORT EQUIPMENT
5 13800 General
1 13810 Arresting, Barrier, and Barricade
2 13820 Launching (Shipboard and land based)
13830 Ground Servicing
13840 Ground Handling
4 13850 Maintenance, Repair, and Checkout

13900–13999 INSTRUMENTS AND LABORATORY EQUIPMENT
13900 General
13910 Navigational and Fuel Consumption Instruments and Computers
13920 Flight Instruments
13930 Automatic Pilot Mechanisms and Airborne Gyro Components (Use 10171 for training devices).
13940 Engine Instruments
13950 Aerological Instruments and Equipment
13980 Aircraft Alarm and Signal Systems (Include oxygen pressure signals and warning devices)
13990 Combination and Miscellaneous Instruments

APPENDIX F

CNO LETTER SERIAL 641/1550

This letter is an example of a Navy request for the capability to file and retrieve messages by subject. It is reproduced here for ease of reference.

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

IN REPLY REFER TO
Ser 641/1550
16 Dec 1974

MEMORANDUM FOR THE DIRECTOR COMMAND SUPPORT PROGRAMS
(ATTN: Op-942)

Subj: Message handling system for the Navy Command Support Center

Encl: (1) Requirements statement

1. The Navy Command Support Center (NCSC) monitors and coordinates information concerning Navy matters, situations and emergencies of naval or national interest. In following a crisis, exercise, or a specific operation, many plain text/narrative messages are received that are of significant operational interest and which must be retained for reference purposes. Under current procedures, the Command Center specifies to the OPNAV Telecommunication Center those messages it wishes to receive. When received, messages are reviewed and significant items are selected for retention in locally defined manual files (folders). This technique for filing significant messages (for whole text reference) is unwieldly during normal operations and nearly unmanageable during crisis situations. Requirements for message paging, cross reference, and location, (16 separate files for the October 1973 Middle East crisis) become so great during crises that the efficiency of the watch team drops to an unacceptable level.

2. To facilitate crisis management actions and normal NCSC operations, the NCSC message handling procedures should be automated. The system should be designed to receive messages on a CRT for review and retention in an appropriate file if desired. If the message is to be retained, it should be placed in files catagorized by subject or some locally defined parameter, for retrival as required. The system should also provide for a local printer and the capability to access messages that are on file in the telecommunication computer (exceptions to be defined by Op-941). Detailed requirements are outlined at enclosure (1).

3. It is requested that this requirement be validated for the NCSC and for possible use at the FCSCs.

K.T. WEAVER /s/
Captain, U.S. Navy
Director
Fleet Operations, Readiness and
Navy Command Support Center Division

REQUIREMENTS STATEMENT

A. Software

- Interface with the LDMX to permit routing of selected Narrative/plain text messages to Command Center CRTs for review and file. (Formatted messages such as MOVREP, RAINFORM etc., automatically go to update existing/planned files). Selection criteria to be defined. The program should be flexible enough to provide the capability for rapid implementation of additional selection criteria as dictated by ongoing/planned operations.
- Operator alert cue that messages are in buffer for review.
- Automatic arrangement first by precedence then by DTG of messages in buffer to be reviewed.
- Automatic alert to operator when higher precedence message is received. If operator elects to override the existing display and view the higher precedence message immediately, the replaced message automatically returns to proper queue location in local buffer.
- Display of messages to operator for review and selection for file or discard.
- Local "ready store" files as defined by the operator. Keyboard (function key?) designation of file selected for message storage.
- Keyboard operator text entry of comment/pertinent information other than messages selected.
- File retrieval and display be designated file and/or subject.
- Local storage capability for 5-10 master files with up to 5 "sub-file" categories under each.
- Index for each file and sub-file. Operator keyboard entry for addition/deletion/ modification of index.
- Display index of messages contained in each file and sub-file by DTG and subject (may also want originator, addressees and precedence indicated).
- Operator request for retrieval and display of message by any of the following: DTG, Originator, and subject.
- Hard copy printout of keyboard designated information from files.
- Local file purge to history files for storage and later recall. (tape, micro film?) Purge criteria based upon both volume and time with volume being primary criteria, e.g. heavy volume may require purge after 30 days to preclude unwieldy file size with corresponding difficulty on review, whereas for an ongoing operation with a small traffic volume it would be desirable to retain unpurged local files for 3 months or more.

B. Hardware

- A/N CRT capability in Command Center - up to three positions to permit simultaneous review/selection by 3 operators during peak periods.
- Hard copy device in Command Center for printing small volume requests - e.g. copy of info on CRT face, 1-5 pages of data from file.
- High speed printer not located in Command Center for printout of entire file or sub-file. Control from Command Center, printer may be located in Comm. spaces.

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